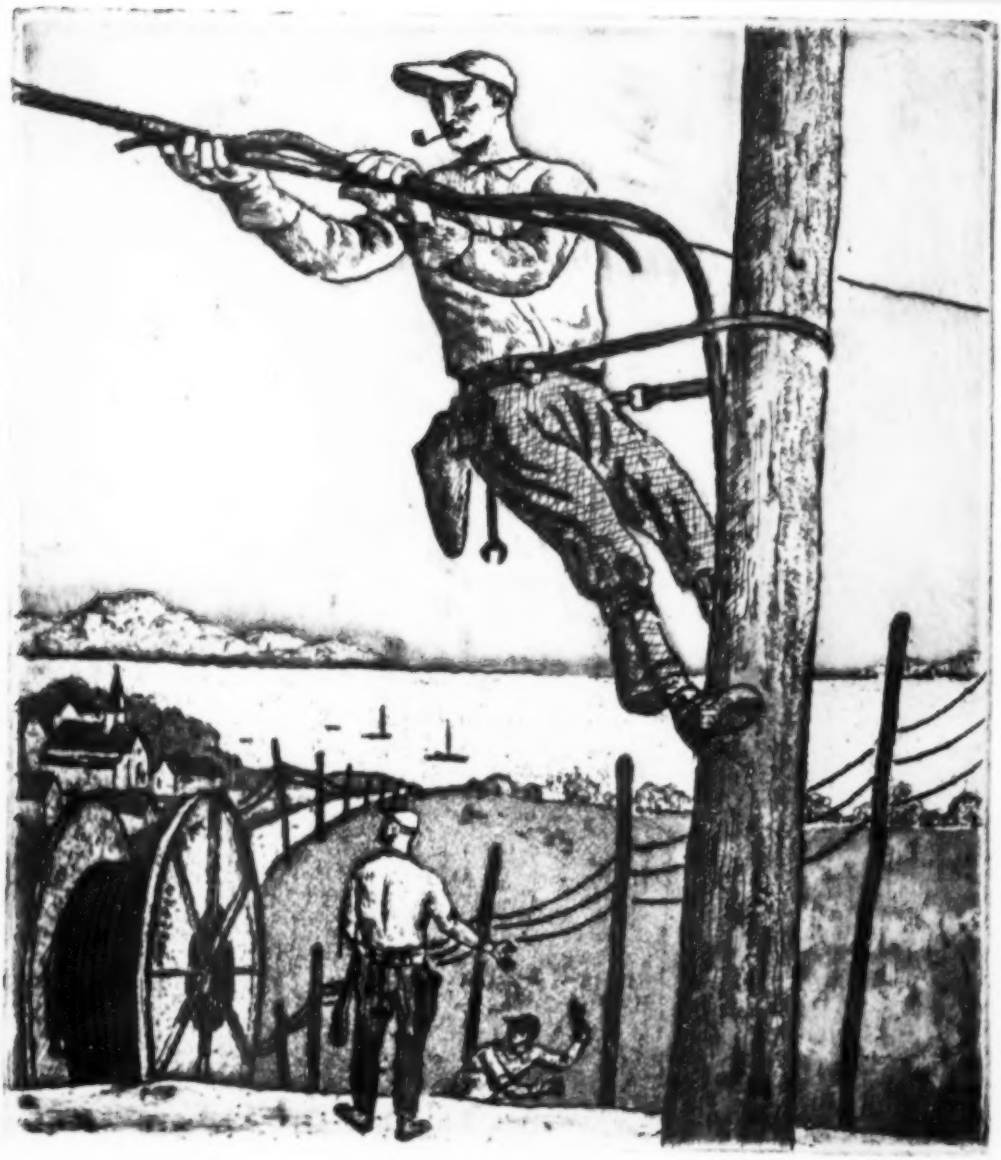
Bell Telephone MAGAZINE

WINTER 1954-55



COMMUNICATIONS FOR TOMORROW: Line Crew Placing a New Cable

VOLUME XXXIII
NUMBER FOUR
WINTER 1954–55

Bell Telephone Magazine

A non-technical review, published quarterly to give Bell System management people a broader view of the history, objectives, operations, and achievements of this business than they might attain in the course of their day-to-day occupations, and an added sense of participation in the problems and accomplishments of our nation-wide public service.

A MEDIUM OF SUGGESTION and A RECORD OF PROGRESS

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JUDSON S. BRADLEY, *Editor*

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CLEO F. CRAIG, *President* S. WHITNEY LANDON, *Secretary* JOHN J. SCANLON, *Treasurer*

Who's Who & What's What

IN THIS ISSUE

A. T. & T. President Cleo F. Craig

SINCE JULY OF 1951, CLEO F. CRAIG has been President of the American Telephone and Telegraph Company. His Bell System career, beginning in 1913, illustrates how broad may be a man's experience within the corporate confines of one or two companies. For his assignments in the Long Lines Department took him from St. Louis to Kansas City and Atlanta en route to New York, and to such diverse posts as district plant chief, plant accountant, and construction supervisor, among others—with a six-year interval as a special representative in the A. T. & T. General Department—before he became general manager of Long Lines in 1933. He was elected Vice President in charge of the Long Lines Department in 1940, and the following year moved to A. T. & T. headquarters. There his vice-presidential responsibilities included, in turn, charge of the departments concerned with Personnel Relations, Operation and Engineering, and Finance and Revenue Requirements.

The foregoing is reprinted from this MAGAZINE for Summer, 1952. At the beginning of 1955, it still seems appropriate as a brief statement of an outstanding telephone career.

FROM THE LONG LINES DEPARTMENT, where he had been district plant engineer in Richmond, Va., JOHN H. MITCHELL came to the toll service group in A. T. &

John H. Mitchell—who knew Carol, Edna, and Hazel

Stanley G. Ericson, relaxed

T.'s O. and E. Department last Autumn—just in time to become involved with the hurricanes which he discusses in this issue. After two years of Army service in the Signal Corps, he joined Long Lines in 1946. Experience as equipment maintenance man, engineer, statistical accountant, traffic assistant, and communications engineer, in Washington and New York, preceded his Richmond assignment in 1953.

TELEPHONE NUMBERS ceased long ago to consist of numbers only—and that was about the time the matter began to get complicated. The necessity for simplifying again is the topic of STANLEY G. ERICSON's contribution to this issue. He joined the Chesapeake and Potomac Telephone Co. in Washington as a traffic student in 1929, and by 1948 had become general traffic manager. He continued in that office until 1952, when he moved to A. T. & T. Co.'s O. and E. Department as traffic organization and training engineer. Since joining the latter company he has acted as traffic results engineer, and on January 1, 1955, he was appointed traffic facilities engineer.

KNOWN TO HUNDREDS throughout the Bell System, JACK CLARK has served on both coasts since starting in the Commercial Department of the Upstate Area of the New York Telephone Company in 1929. After holding various positions there, he joined the business office section of the O. and E. Department in 1943, and in 1946 crossed the continent to the Northern California Area of The Pacific Telephone and Telegraph Co. There he was successively general commercial supervisor and assistant to the vice president and general manager, and division manager of the Coast Division, before returning to A. T. &. T. in 1952 as business office engineer. The major contribution the business office service representatives make to the Bell System's sales program is pointed up in his article.

(Continued on page 272)

Jack Clark between a sales chart and James C. Thackray, who helped with the article

Alexander Graham Bell
HE FOUND THE MEANS TO SPEED
THE SPOKEN WORD TO DISTANT PLACES

A talk at the annual meeting of the Life Insurance Association of America in New York City on December 8, 1954

BIG BUSINESS AND THE COMMUNITY

CLEO F. CRAIG

President, AMERICAN TELEPHONE AND TELEGRAPH COMPANY

IT IS A GREAT HONOR to be your guest and to have this—for me—almost unique opportunity to do some of the talking at an insurance gathering.

On certain previous occasions when I have sat down with insurance men, my side of the conversation has consisted largely of just saying yes or no, as the case might be. And as often as not, when the other fellow had paid for the lunch, I was off to the doctor for a physical.

Looking back on those sessions, and forgetting how I might have felt then, I can't tell you how grateful I am now. And I realize that nothing I may say to this audience can be useful to you in anything like the measure in which the thinking and counsel of insurance men have been valuable to me.

However, you in life insurance and we in the telephone business have much in common. And that encourages me to compare notes with you.

For instance, we are alike in being service industries. We are alike in being big. We are alike in that everything we accomplish depends on how well the hundreds of thousands of men and women in our respective organizations get along in each of their communities. As still another similarity, we both need to look ahead and make the best forecast we can of things to come.

With this last point in mind, one of your members suggested that I say something about how we in the Bell System try to look ahead, and what we think we see.

I am quite willing to do that, but apropos of how to look ahead scientifically, let me remind you of the eminent astronomer who paid a visit to Mt. Palomar Observatory. He peered long and intently through the big telescope. Finally he said, with the air of a man who has discovered one of the secrets of the universe, "It's going to rain."

An assistant who was standing by said, "Is that so, Professor? How can you tell?"

The great astronomer replied, "My feet hurt."

Opposite: Alexander Graham Bell plaque installed in lobby of A. T. & T. building in New York. Painted for BELL TELEPHONE MAGAZINE *by George Samerjan.* *See page 242.*

Now just as he tried to take all the important facts into account, so do we in the telephone business. We look to see where people's feet are taking them, how much money they have to buy what they want when they get there, and how many additional folks of all ages will be around next year and the year after that.

In each community we study the extent and direction of growth of dwelling units and shops and other businesses, the prosperity of the industries in the town, all local activities that may have a bearing on communication needs.

We estimate those needs town by town, add them up, check the result against long-term growth trends and the general business outlook. In this way we judge what the over-all demand for telephone service may be.

That's one side of the equation of the future. The other side, as I've already indicated, is the same in our business as in yours: the character and capacity of our people; not merely their technical abilities, but what they think and what they *want* to accomplish.

I'll say more about that later.

First I'll stick my neck out and do some forecasting as requested. I'll start with the immediate future and go on from there. The only hedge I'm obliged to make is that these comments are based on the assumption of no major change in the international situation.

For the country as a whole, we think industrial activity is going to improve moderately in 1955 and also 1956. How much? Maybe five per cent each year as we now see it, so that at the end of the period the nation will be operating about on the peak levels of 1953.

For the Bell System we are also optimistic. This year we shall gain about 1,900,000 telephones—the same as last year. Next year we expect to have a gain in excess of two million telephones, and I won't be surprised if we exceed two million again in 1956.

". . . how many additional folks of all ages will be around next year . . . ?"

". . . the service is going to keep on getting better . . ."

Another important factor is our long distance traffic, which is setting new records. This is now running about ten per cent ahead of a year ago—whereas five or six per cent has been nearer to our normal increase. Perhaps part of the reason is that autumn a year ago showed no gain. In 1955 we expect the total volume of long distance conversations to be five to ten per cent above the present record levels.

Now to look a little further ahead.

When the war ended, the Bell System was serving about 22,000,000 telephones. Today we have 43,000,000. By 1965 we think the number will be at least 55,000,000; probably more.

So we foresee a good, substantial, healthy growth. We have always grown faster than the country as a whole, and we think that will continue.

I'm also quite sure that the service is going to keep on getting better. People have made it pretty plain that they like to dial their calls. That's the fastest, most convenient, and most accurate way of completing a connection. At the war's end 65 per cent of our 22,000,000 telephones were dial. Today 83 per cent of the 43,000,000 are dial. Five years hence the proportion will be 95 per cent or more.

Along with this there's going to be a great increase in long distance dialing. You may not realize it, but right now the operators are dialing half of all long distance

calls straight through to the distant telephone.

When you place a call with the New York operator for a San Francisco number, she dials that number direct from her switchboard here in New York and the called telephone in San Francisco rings automatically in a matter of seconds.

Telephone users themselves are dialing directly about a quarter of the calls that go outside their local area. Most of them are over relatively short distances; but there are now about 25 places—or will be by the end of the month—where people dial many of their longer cross-country calls as well.

By 1965 we expect that you folks in the room will be dialing a majority of your long distance calls, cross-county and cross-country. This means that going anywhere you want to go by telephone will be easier and faster.

NOW TO TURN from service to dollars. As I understand it, assets of the life insurance companies have grown since the war roughly from 45 billion dollars to 83 billion dollars or thereabouts. Total capital of the Bell System has gone from 4 billion dollars to 11½ billion dollars—an even greater proportionate increase.

Our expenditures for new construction during the nine post-war years have averaged about a billion two hundred million dollars a year. They will be close to a billion four hundred million this year, and perhaps a little more in 1955. Of special interest to you, our need for new money is roughly in the order of 200 million dollars every three months.

It would be pure speculation to guess just when Bell System capital will total 20 billion dollars instead of 11 billion plus, or when we may be owned by two million share owners instead of 1,300,000.

But I would be sure that day is coming—just as you must foresee that instead of having obligations of a mere 300 billion dollars of life insurance in force (or something more than the entire national debt), you are going to be responsible for 500 billion or 600 billion dollars or whatever it may turn out to be.

Now I've talked a lot of figures. From them it's clear that we in the Bell System are going to stake more billions on the future—many more. That's what all our experience and study tell us is right and necessary to meet the tremendous growth that is surely ahead in this country of ours.

I'VE BEEN QUOTING FIGURES partly to stress the sheer immensity of them, but mainly to lead up to what is most on my mind. Exact amounts don't matter. What really matters to me, as it must to you, is that what we are doing has such enormous impact on the community.

It isn't just a situation of big business getting bigger. It's also a matter of becoming a bigger *part* of each community: a bigger part of the United States, a bigger part of New York City, a bigger part of Springfield and Junction City and Punkin Creek. What we do and how we do it means so much—and becomes more and more important all the time.

Others know this just as well as we do. The country knows it, New Yorkers know it, and they know it down in Punkin Creek.

First off, I think most people see the benefits to them. Americans everywhere, in my opinion, are seeing more clearly the direct relation between bigness in industry and the rise in our standard of living.

". . . becoming a bigger part of each community . . ."

They know large-scale organization is essential to the country's welfare and security. They are beginning to understand that big business is largely responsible for the many material benefits of life they enjoy.

But—

The more widely Americans do realize this, the more also, it seems to me, they are coming to hold big business to what *they* believe are its *total* obligations.

And if great enterprises such as you and I are concerned in managing are in fact a basic foundation for our kind of life, then our obligations of today and tomorrow may well be broader—far broader—than we have ever conceived them to be.

In fact, I'll say it this way: If we whose services so vitally affect the community are not successful in working for the good of the community, *from the community's point of view*, then that view will have scant place for us as we are now constituted.

Now I'm aware this is not an original thought. And I'm glad that is so. I'm glad so many large organizations are going on the premise that they must have a deep concern in community well-being.

Perhaps one way to express it is this: that the bigger we grow, the more we must make sure we stay small in the community.

I mean by that—make sure we keep our closeness and intimacy with the people in every town and neighborhood; make sure we are in and of each community, not outside, above, or against it; make sure that the people who carry on our business in every city and town do not think of the company's interest as one thing and the community's interest as another.

You don't have to define what makes a good community to know that it is not one

". . . *in working for the good of the community* . . ."

". . . the people who carry on our business in every city and town . . ."

in which those who have the most to contribute are thinking only of themselves. That remains true even where ideas differ widely on what constitutes the public interest and how it can best be served.

I would go farther and add that self-serving will not even promote self-interest, for in this country the community still keeps more power than any of its members and that is likely to continue.

It is only by staying small and close and intimate in the community, in my estimation, that we shall have the chance to show that human satisfactions may be achieved in the largest degree through the operation of private enterprise.

And how practically can we go about it?

There's only one way I know. It's to help each member of our respective organizations to do his full part right where he lives and works. And I think this is the essential that we have to start with when we speak of "decentralizing."

Certainly I have no question about the need to push out authority as far as possible—all the way out to our men and women who are really in and of the community.

But in order to carry the load adequately, they must be broad people.

And how can we assist them in getting the experience, the skill, and the breadth of view to do this job well?

Until better ways can be found, it seems worth while to us in the Bell System to take people off the job for long enough periods so that they will have time to listen, think, read, and discuss—get into their minds a broader concept of what their job really is—and strengthen their talent to carry it out.

Further, it has seemed to us that the place to start is within the top manage-

ment group itself, so that is where we are putting a good bit of our first effort.

I want to say very humbly that we don't regard what we are doing as anything like an adequate answer to the questions I have been raising.

We are just groping. We're in the first grade. But you have to make some kind of start if you want to learn anything—and that's what we are trying to do.

Our most substantial effort, in numbers of people, is what we call the Bell System Executive Conference. Every month a new group of forty department heads from all sections of the country is meeting at Asbury Park, New Jersey, for a four-week conference. This has three objectives: to broaden thinking and outlook, to increase present effectiveness, and to stimulate interest in further self-development.

We started this about 15 months ago, and 700 key executives in our business will have participated by June of next year. The men are generally in their late 40's and have been in the telephone business 25 years or more.

A typical group will include a plant construction and maintenance head from Canada and an accounting manager from the Deep South; a man who has charge of all telephone business offices on Manhattan Island and another who heads the traffic forces in Wyoming. Along with these and other operating men there will usually be engineers, laboratory scientists, manufacturing superintendents, lawyers, a medical director, and a few other staff people.

They live and eat and study together. Morning sessions are largely case problems, with guest speakers in the afternoon.

". . . time to listen, think, read, and discuss . . ."

". . . testing the values of study in the humanities . . ."

Many of the speakers are from fields other than business. The group considers the ideas of economists, sociologists, psychologists, historians, and others.

One will handle the economics and politics of the Federal budget, or perhaps farm price supports. Another will discuss minority groups and American business. We even have talks and discussions on international problems. In every instance, the talks by guest speakers are preliminary to questions and free discussion.

There is no teacher-to-pupil instruction in the usual sense; no preaching. There is no asking or advising the conferees to "think and act in the interest of the community."

But does the give-and-take of minds help to broaden viewpoints? Does it stimulate new insights—give a man a better understanding of the relation between his job and the world around him?

I can't help but think it does. And those who are taking part seem to think so too.

Maybe some different approach would be better, but we can only learn that through experience. Certainly we keep introducing new ideas into this one. And the committee in charge isn't content with

only a four-week program. They continue to send the conferees reading materials after they are back home, and are c· ·ler- ing what to do about further sessio.. after a couple of years or so.

ANOTHER DEVELOPMENT, which is purely experimental, is a program conducted by the University of Pennsylvania especially for the Bell companies. At the suggestion of The Bell Telephone Company of Pennsylvania, the university a year ago started The Institute of Humanistic Studies for Executives.

This is a ten-month full-time program, and away off the conventional path of business education. Last year there were 17 men in the group, this year 19—most of them a little younger than those in the Asbury Park conference.

The program is testing the values of study in the humanities: literature, art, history, music, philosophy, the social sciences. This is a radical departure. Will it help us toward better ways of growing broad-gauge people?

I can only say—we have hopes.

And we are probing in other ways too: using after-hour and other programs offered by several universities, taking part in the Sloan Fellowship program at M.I.T., entering our people in courses conducted by the American Management Association. We are bringing guests in to our regular management conferences.

But we are still just nibbling at the edges of the whole matter. In the Bell System we have a group of about 10,000 people in the third level of management and above. There are 70,000 more in the first two levels. These experimental stones we are tossing in the pond have a long, long way to send their ripples.

TO THINK and to act in the community's behalf is not an attitude that can be imposed. It is not brought about through a procedure. It can't be produced by direction.

But if we can create a climate in management that nourishes this way of life, then it will grow spontaneously and naturally and not at the expense of other obligations of management.

Perhaps we are learning a little about how to build such a climate. That is the most I feel justified in concluding at this moment. But I hope very much that we and others in industry will continue to work at it, even though we may fumble a bit in the process.

All we need to do is act on our faith that the job deserves our best efforts. The result, I am convinced, will be of lasting benefit—in our own affairs, to all business, and to the country.

Three deadly hurricanes, assailing the East in seven weeks, find Bell System Plant groups ready—with manpower, materials, and organization—for any test

PLANNING AHEAD TO MEET DISASTER WHEN IT HITS

JOHN H. MITCHELL

PLANT DIVISION, O. & E. DEPARTMENT, A. T. & T. CO.

THREE VICIOUS HURRICANES, attacking in rapid-fire order this past Fall, inflicted the greatest damage to telephone plant ever experienced by the Bell System during so short a period. At no other time in history have Bell companies been required to restore service to over a million telephones, and spend seventeen million dollars doing it, all in the space of just seven weeks.

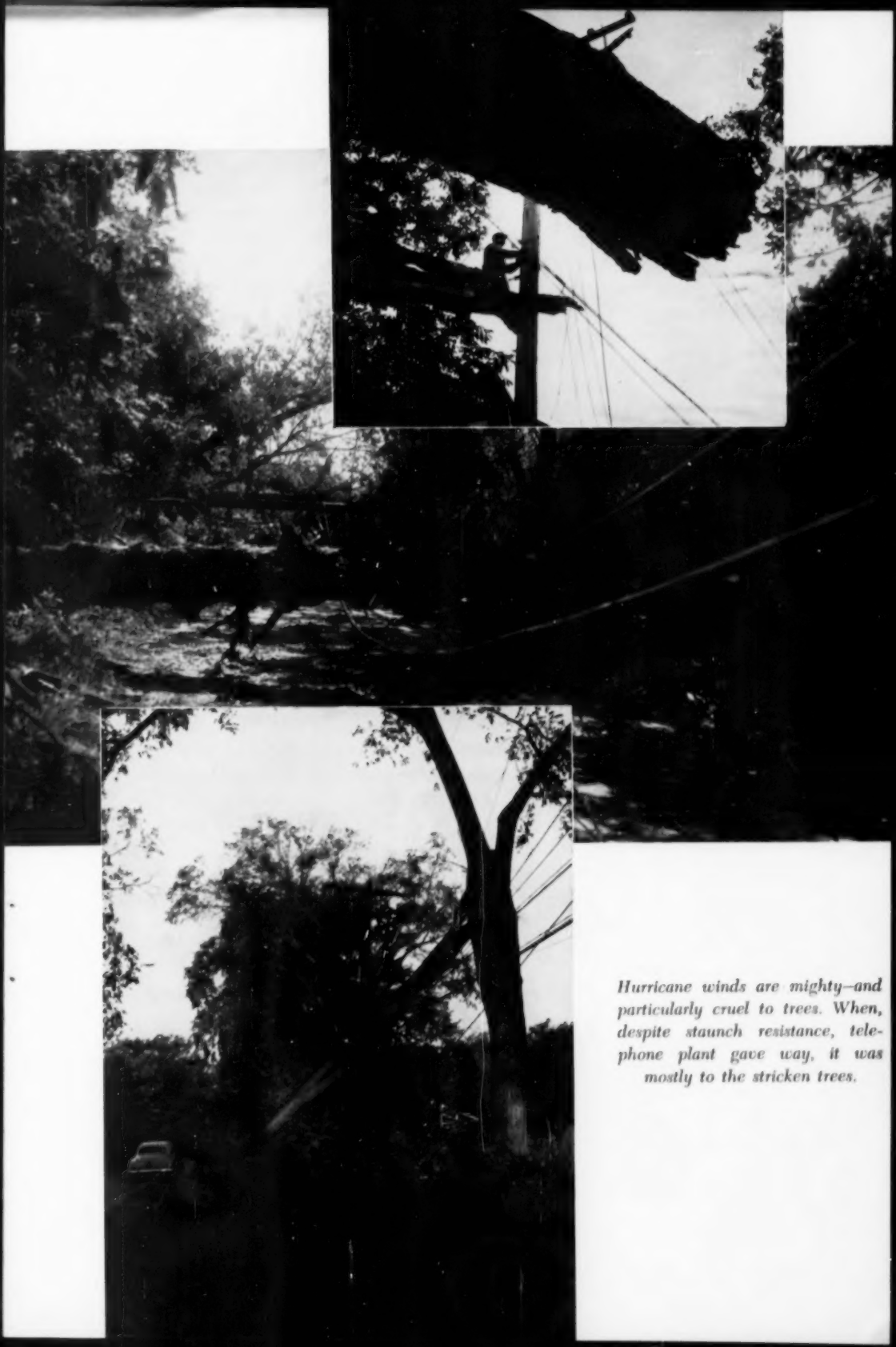
On August 31 the first of the hurricanes, nicknamed Carol, roared through New England, leaving 334,000 telephones dead and buried in wreckage. From this tangled destruction telephone people resourcefully gathered together enough loose ends to restore normal service in just six days. But the job of cleaning up the outside plant went on. Home forces, still assisted by some of those who had earlier answered the call for help, righted tilting poles, resagged strained wire, straightened twisted cable—did everything necessary to return the battered plant to its former tidy condition. No sooner had the visitors set their last pole, picked up their tools and looked homeward than they heard the ominous warnings of another hurricane. So they stayed on; and some who had already hit the road turned around and headed back when summoned on a Connecticut parkway.

Then on September 11 they watched as much of their good work fell victim to the second hurricane in 11 days. Edna, so called, a fiercer hurricane but choosing to travel more by sea, swept away service from 295,000 telephones, many for the second time, as she skirted north and then east along the New England coast. Undismayed, telephone people set to work again. Neighboring forces returned to do over much that they had just completed. At the end of five days, service was once again normal for an anxious public.

As the days turned into October, hurricanes had become a part of the past to most people. Two weaker sisters, dubbed Florence and Gilda, inconspicuously stayed close to home in the Gulf of Mexico or Caribbean. With two powerful storms in

1954 Hurricanes

	"Carol" August	*"Edna" September*	*"Hazel" October*
Service Interrupted			
Telephones	334,000	295,000	448,000
Restoration Forces			
Total Participating	11,400	11,500	21,750
Borrowed People	1,658	1,947	None from
Borrowed Vehicles	900	1,100	Other Companies
Estimated Restoration Costs			
Expense (Millions)	$4.5	$4.1	$4.2
Capital (Millions)	1.7	1.4	1.3
Total (Millions)	$6.2	$5.5	$5.5
Restoration Interval			
Days	6	5	6



Hurricane winds are mighty—and particularly cruel to trees. When, despite staunch resistance, telephone plant gave way, it was mostly to the stricken trees.

one year, it seemed that history enough had been made when during early October the name "Hazel" first appeared on official Weather Bureau advisories. Although she was characterized initially as a "small hurricane," telephone people followed her with a suspicious eye sharpened by painful experience. Gradually she generated great strength and, as if waiting to muster all of her fury, she hovered in the Caribbean area for several days. Suspicion turned to concern as she slowly started her journey northward, demonstrating her destructive power at Port au Prince while passing between Haiti and Cuba. By the morning of October 14, Hazel swirled furiously 300 miles off the coast of Florida, moving northward rapidly. Although her course could still turn seaward, the time had come to prepare for the worst. So telephone people up and down the coast took stock of their manpower, their supplies, and poised to fall in right behind her.

IT IS WELL they did, too, for on the morning of October 15 Hazel struck inland across the coast of the Carolinas and turned northward to pierce the heart of the Northeastern states. Her timetable carried her through Virginia by day, over Washington, D. C. and into Pennsylvania by nightfall. Knowing no hours, she roared on through the night over New York State toward Canada, brushing twice-battered New England on the way.

On her rampage she spread her destruction with surprising impartiality, for Hazel misbehaved—she did not dissipate rapidly, as hurricanes usually do when traveling overland. In central New York and Pennsylvania trees were uprooted, buildings shorn, railroads blocked and power lines scattered nearly as severely as in Virginia or Maryland. Unable to hurl her violent winds over the Allegheny Mountains, her western flank reached out to join an approaching cold front in dumping a deluge of flooding rain on western Pennsylvania and northern West Virginia. Even by the time she reached Canada, she still had enough of her watery fury to lend a damaging hand to heavy rain already falling there.

Disruption of telephone service followed the same pattern—and it was severe. Some 448,000 telephones were silent in South Carolina, North Carolina, Virginia, West Virginia, Washington, D. C., Maryland, Pennsylvania, New Jersey, New York, and the lower New England states. An additional 43,000 telephones succumbed to floods in the Toronto area.

Yet telephone plant withstood the furious blasts remarkably well—especially the long distance portion. As during Carol and Edna, it was the trees that gave way to the overpowering onslaughts of Hazel's gales. Large and small, stricken trees or their limbs, entwined with crackling power wires crashed into telephone lines to tangle wire, mangle and burn cable, tug at poles.

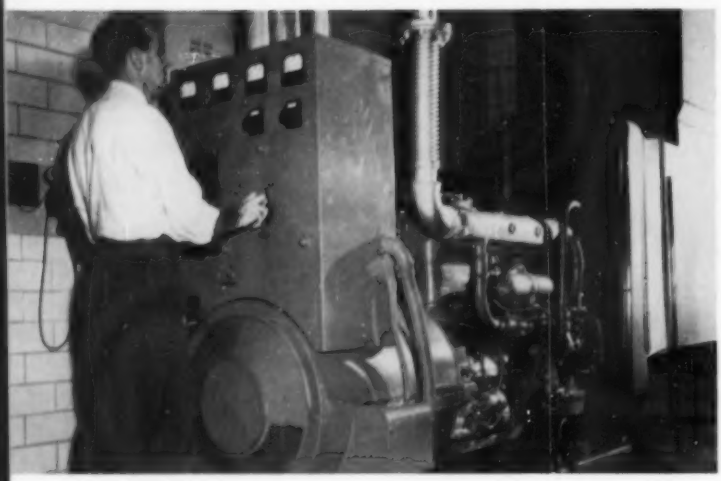
So for a third time Plant people picked up their tools, loaded their trucks, and set out on the discouraging task. Over 21,000 of them this time, and 5¾ million dollars were needed to put the telephone house in order. But they needed only 6 days to return service to normal.

Only an organization of great resources —men, materials, equipment and money— could withstand such a staggering loss. And only an organization steeped in the broadest spirit of service would undertake so willingly such a difficult task.

THERE ARE COMPELLING REASONS why the Bell System should be this way. Telephone

Rugged plant and clean rights-of-way thwart rigors of rugged country—and hurricanes.

A covering of earth protects many cables from violent acts of nature, but only diligent campaigning can protect them from deeds of men.



To insure a steady flow of electrical power—the life blood of telephone apparatus—emergency power plants, permanent or mobile, take over when regular sources fail.

service is important to everyone, everywhere—but most important in time of emergency. By public consent the Bell System and the Independent connecting companies are the only source to which the public can look for telephone service. That there is an obligation to furnish the highest quality, most reliable service possible is beyond question. That this obligation has been met is evidenced by the public confidence developed over the years. Today even greater reliability is demanded by more exacting communications systems, growing in size and number, and by the dependence of the nation's defense on Bell System services. So Bell System people are "service conscious"—conscious that their facilities must resist service interruption, conscious that service must be restored quickly if interrupted.

Plant Is Reliable—On the Outside

TO RESIST SERVICE INTERRUPTIONS, telephone facilities are made to be reliable. Bell Telephone Laboratory physicists, chemists, mathematicians and engineers combine their ingenuity to develop stable equipment and to determine the most durable materials. Bell engineers design outside plant to be sound; construction forces build it to be sturdy. Important rights of way are maintained free of obstructions and clear for accessibility. Many cables gain the additional protection of being underground even though increased cost and the need for dropping off services house-by-house limits this type of construction. Many are filled with gas under pressure to keep out water. Plant protection programs are vigorous to guard against the greatest single hazard to underground cables: the excavating and digging activities of others. These are but a part of the outside plant program aimed at minimizing service interruption.

—And in the Central Office

IN THE CENTRAL OFFICE TOO, Bell System people strive for reliability—in design, operation, and maintenance. For instance, development engineers design carrier systems that will automatically measure their own performance and compensate for normal variations and certain irregularities. Complex intertoll switching systems, with minds of their own, test trunks or lines automatically and help to analyze their own faults. Alarms to signal impending

failure and testing provisions are integral features of much of the equipment. "Patching" facilities to maintain continuous service by rerouting, protection channels which automatically back up important micro-wave and coaxial systems, spare equipment ready for quick replacement duty—all play a part in safeguarding service. And of great importance, emergency power plants, permanently installed or mobile, ensure a constant supply of electrical power, the life blood of telephone apparatus.

And the Bell System Prepares for Service Restoration

In spite of such care, plant does fail upon occasion, when confronted with situations which economically it cannot be designed to withstand. So the Bell System prepares for swift, orderly restoration. Critical services may often be involved and they demand immediate attention. Plant damage may be extensive, but in the large web of Bell System circuits an alternate route can almost always be found. All vital services receive priority in restoration. High on the list is the community whose communications have been cut off from the outside. By whatever means possible, land line or radio, it is a primary duty to establish at least one long distance circuit as an outlet for emergency calls. Of equal importance are vital government or municipal services, broadcasting networks, and other important commercial circuits. All services not rerouted are returned to use as rapidly as damaged plant is repaired.

Plant Restoration Requires Men

Restoration of the plant itself requires men, materials, coördination—and, for the severe case, plenty of each. Plant Department manpower, of course, is arranged and scheduled to do the most efficient day-to-day job. Much time is spent to see that they are well trained and money is spent to see that they are well equipped. Plant and problems being basically similar throughout the System, they all follow the same practices, use standard equipment. Although the force in any particular locality is large enough to handle only the smaller emergencies, additional men with the same training and equipment in a neighboring area are always ready to lend a hand.

—And Materials

The Western Electric Company furnishes most materials and supplies used by the operating companies. Equipment, tools, materials, and miscellaneous supplies—items standardized for use by these companies—comprise Western's line. The companies order these through their supply organizations from their local Western Electric Distributing Houses—29 of which are located throughout the country.

The operating companies keep in their storerooms plant supplies required for the routine job. In limited amounts they keep special emergency stocks such as spare reels of cable, test equipment, and quantities of paired wire or coaxial patch cords for spanning bad sections of cable. These are usually sufficient for the minor emergency. During the large emergency the Western Electric Company can be relied upon to deliver in quantity day or night. When stocks in local distributing houses dwindle, they make rush shipments from distant houses or factory stocks.

—And Coördination

But force and materials alone will not do the job. Effective use of these requires

While awaiting repair of plant, emergency service can be temporarily established by Telebus, emergency radio, or mobile service.

coördination or direction—and this must come from the organization. The Plant organization in one area is similar to that in other areas throughout the System. Beginning with the craft people in the field or test centers, the line organization focuses upward through the foreman, supervising foremen, service or construction supervisors, district managers, division superintendents, on up to the area and general managers. This "chain of command," meeting best the normal business requirements, easily gears itself to the rushed tempo of emergency situations.

Staff organizations in the district and at higher levels normally follow the day-to-day operations, keep an eye on performance results, review working practices, prepare reports, as well as performing many other duties to assist the field people and the manager in running a "taut ship." In time of emergency, this is a particularly valuable group which performs a special coördinating function by summarizing damage conditions and arranging for necessary restoration needs.

All Play Their Parts

ALTHOUGH THE LARGEST JOB during an emergency usually falls to the Plant Department, essential roles are also played by the Traffic Department, which mobilizes to handle swelling traffic volumes; the traffic control groups, who constantly maintain the best balance between shifting traffic loads and available circuits; the Commercial people, who take the initiative in seeing that hospitals and other vital public agencies do not go without telephone service; Accounting people, who help the field in charging time and expenses to proper accounts; and Public Relations groups, who keep the public informed about restoration progress. Their organization and administrations, like that of all Bell System departments, must function equally well during the day-to-day operation or the emergency. Minimum departure from established channels and procedures is fundamental to orderly restoration.

Restoration—The Lesser Emergency

IF RESTORATION POTENTIAL in ample degree does exist—and it does—then how well does it function when called upon. Take, for example, a "minor" emergency—say the failure of an important underground trunk cable last year. A plumber, placing a new water connection, had driven a pipe through the conduit into a 600-pair cable. It didn't take long for a reaction. Immediately, lights and bells in the central offices signaled serious trouble, while calls from subscribers flooded repair service. Central office forces jumped to rerout as many vital services and trunks as possible, to begin their electrical measurements for determining the location of the trouble, and to alert construction and cable repair crews. By the next morning a new piece of cable, on hand in the store yard, had been pulled in between manholes and cut over, and service had been fully restored.

This emergency, minor in scope, was coördinated by the district organization, and disposed of by local construction forces using storeroom supplies normally stocked. They handled it easily enough—so much so that it hardly seemed like an emergency.

—The Larger Emergency

OTHERS ARE LARGER, THOUGH—like a flood last spring. Damage was heavy and extended through the territory of several districts. To insure over-all coördination, it was necessary to activate the Restoration Control Center at company headquarters.

Restoration calls for coördination. Here are some of the places and some of the means for exercising this coördination during last Autumn's emergencies.

Under instructions received from this center, manpower moved in from other areas of the company to assist the local forces. Supply requirements were too great for the local Western Electric Distributing House; however, the restoration crews would hardly have known it. Rush deliveries from other areas supplied everything as needed.

—The Disaster

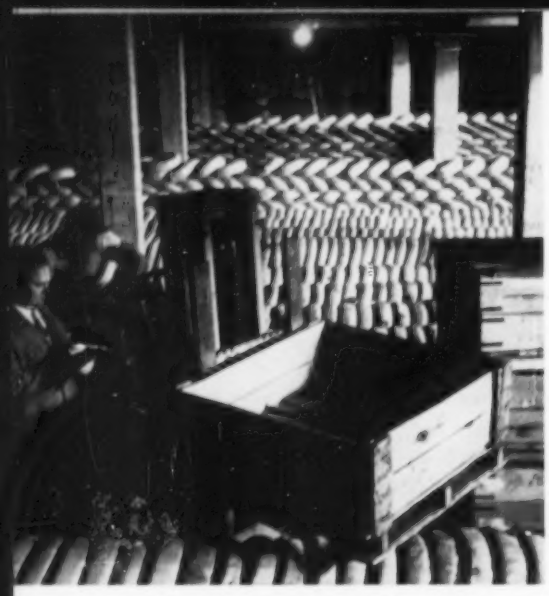
THE RIGOROUS TEST comes during the major disaster—like Hazel, for instance. Damage was extensive, widespread—the need for the telephone great. Yet even before the winds had blown themselves by, Commercial and Plant Department people were working together to restore service of some kind to hospitals, disaster relief centers, and other civil agencies. To do this, Plant men ran temporary wire, patched up cables, and in some cases Commercial people manning company vehicles equipped with mobile radio telephone service stood by to handle emergency calls. Using portable radio equipment designed for just such service, they reconnected communities cut off from communications with the outside. Testing and central office people rerouted other vital services to the extent possible, in accordance with their prearranged restoration plans.

Meanwhile, the Plant Department looked to repair of its outside plant: the most arduous task of all. Muster of restoration forces and materials appeared Herculean. Yet service was back to normal in just six days. And they accomplished it in basically the same manner as repairing the cable or cleaning up the flood damage. For a major disaster like Hazel, though, there must be over-all restoration control at a higher organizational level—a level high enough to encompass all of the operating areas affected. Normal line organization, augmented by the company restoration control centers, provided coördination in the field. Over-all guidance fell to the A. T. & T. Co.'s plant operation engineer's group in New York City.

Here, for several days prior to Hazel's striking inland, those in this group normally responsible for plant damage matters anxiously plotted her path. Early Thursday, the eve of her charge inland, they speculated on her future course. Projected straight, her course crossed the Carolina shores. A smooth curve would carry her seaward, and this was still possible. Passing time reduced the chances—chances they could no longer afford to take. So they alerted those companies north of the straight line, then neighboring companies who might have to lend assistance.

HAZEL FOLLOWED the straight line. The following morning all the necessary accoutrements of a disaster control center were in place. Engineers and group heads from the plant operation groups—men with valuable field experience gained during prior assignments in the operating companies—staffed the center. Those on the early trick went about their duties. Three were talking on the special emergency telephones: one to a mid-western company learning the number of crews it could dispatch if needed, the other two exchanging local weather bulletins with two operating companies. Another plotted Hazel's latest official whereabouts on the large wall map —170 miles east of Savannah, Ga. according to the 5:00 A.M. Weather Bureau advisory.

Shortly after 9:00 A.M., more than 500 miles away, Hazel thundered into North Carolina. In a short time the stark outline



Providing ample supplies when and where needed is Western Electric's role in such emergencies.

of her path would unfold, as the damage reports came in from the companies. At first sporadically, then in a chorus, the telephones rang. "—company storm center reporting. Six thousand stations now out of service, first count of poles broken or down not yet in, 3 central offices now on emergency power. Patrols are out now; still raining hard but wind is down. Will call when we get a later count."

This information, originating from central office and reconnaissance crews which began their surveys right on the heels of the destruction, formed the basis for restoration plans at all organization levels. At the A. T. & T. Co. control center one of its members posted the figures on the grim ledger—a mural-size chart tabulating type of damage versus operating area—and added up the new total. Another, flashing a glance first at the map, then at the damage summary, then back to the map, dictated the next bulletin to be issued for the use of company officials, Western Electric, other department staff groups enmeshed in the emergency, and for Public Relations —who kept the public so well informed.

Forms for recording movement of men and vehicles between companies lay ready but unused on a table. For Hazel spread her destruction over such a large area, it was not necessary to shift forces between companies. However, during Carol and Edna, when damage was heavily concentrated in New England, this center arranged for the movement of large numbers of men with their vehicles and tools into that area. During Carol, the New England Company's call for help—received in terms of line gangs, splicing crews, reconcentration teams, and installer-repairmen—started 1,650 men with 900 vehicles rolling from as far away as Washington, D. C. For Edna, 1,950 men with 1,100 vehicles, including one entire Plant Division from the Michigan Company, came by convoy and by rail to add their might to that of the New Englanders.

The Western Electric Company furnished the third major ingredient for restoration: materials and supplies. Their local distributing houses received the emergency orders from the companies in need. Even before local stocks were depleted, Western had more on the way from other distributing houses or factories, delivering much of it directly to the point of use. A special coördinating group in Western Electric's New York headquarters worked closely with the A. T. & T. Co.'s storm center to anticipate needs and prepare for them. The Western Electric Company made the necessary transportation arrangements which sent the Michigan Plant Division, bag and baggage, rolling eastward on two special trains. The perfection to which the supply role was played was evident in that there were no known in-

stances where a lack of supplies materially retarded restoration activity.

The Result

THE REMARKABLE RECOVERY of telephone facilities during a period of severe destruction unprecedented in its repetitive rate is not the product of chance. Rather it is the product of an earnest recognition of an obligation, *first*, to provide the public with the most reliable service possible and, *second*, to make the fastest possible restoration when that service does fail. Every phase of furnishing service must be devoted to that end. Plant must be rugged, men diligent, supply sure, and organization sound—to resist failure or to correct it. And by way of a third point, the Plant and Engineering Departments are earnestly reviewing the damage resulting from 1954's unprecedented siege, studying the performance of recently introduced methods and materials, seeking whatever clue may lead to improvements for another day and another emergency—whatever may be its nature.

Last Autumn's catastrophic blows proved these points fully. They did more; for the recuperative powers thus demonstrated proved also the Bell System's power, competence and preparedness to face up to any emergency that may strike.

The countryside soon returns to days and ways of peace.

Name prefixes of local significance must give way to standard identifications as growth of nation-wide dialing increases importance of easily grasped words

"WHAT'S YOUR TELEPHONE NUMBER?"

STANLEY G. ERICSON

Traffic Facilities Engineer, A. T. & T. CO.

THIS QUESTION is probably one of the most frequently asked of all—along with "What time is it?" and "How's the weather?" And the answers to it are growing more and more to sound alike, at least as far as concerns the name portion of the number, no matter in what part of our country the question is asked.

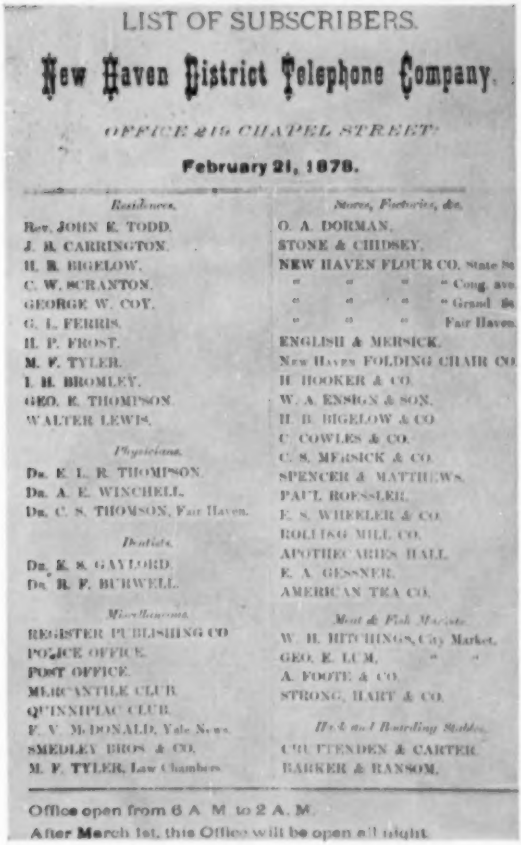
Why is this? Why this change from names which had local significance to those that are "neutral" or "national"? For that matter, why have names at all?

To understand what is happening now, it is necessary, as in so many other inquiries, to go back a bit and see what has happened in the past.

In the very early days of the telephone business, it was possible to be connected simply by giving the name of the subscriber to the operator. With only a few subscribers, the operators could easily remember that the blacksmith shop was 80-J and the drygoods store was 50. Even today, in the very small communities there is still some calling by name and, occasionally, a nostalgic response by an operator, "I know he's not in his office because I just saw him go into the barber shop."

But along with whipsockets and antimacassars, these procedures became outmoded with the passing of time. As the telephone population grew, each subscriber had to be identified by a telephone number—a more impersonal method but a necessary one. Telephone directories and calling by number became required adjuncts to satisfactory telephone service. In the earlier days, these telephone numbers were composed of numerals only, and, as long as there was only one central office in a city, there was no need for a name-and-numeral combination.

As growth continued, the physical capacity of the first office in a city was reached and a second or "branch" office had to be opened. This brought with it the need for differentiating between the first and second in some manner. The choice lay between designating the offices



LIST OF SUBSCRIBERS.

New Haven District Telephone Company.

OFFICE 219 CHAPEL STREET.

February 21, 1878.

Residences.

Rev. JOHN E. TODD.
J. B. CARRINGTON.
H. B. BIGELOW.
C. W. SCRANTON.
GEORGE W. COY.
G. L. FERRIS.
H. P. FROST.
M. F. TYLER.
I. H. BROMLEY.
GEO. E. THOMPSON.
WALTER LEWIS.

Physicians.

Dr. E. L. R. THOMPSON.
Dr. A. E. WINCHELL.
Dr. C. S. THOMSON, Fair Haven.

Dentists.

Dr. E. S. GAYLORD.
Dr. R. F. BURWELL.

Miscellaneous.

REGISTER PUBLISHING CO.
POLICE OFFICE.
POST OFFICE.
MERCANTILE CLUB.
QUINNIPIAC CLUB.
F. V. McDONALD, Yale News.
SMEDLEY BROS. & CO.
M. F. TYLER, Law Chambers.

Stores, Factories, &c.

O. A. DORMAN.
STONE & CHIDSEY.
NEW HAVEN FLOUR CO. State St.
" " " " Cong. ave.
" " " " Grand St.
" " " Fair Haven.
ENGLISH & MERSICK.
New Haven FOLDING CHAIR CO.
H. HOOKER & CO.
W. A. ENSIGN & SON.
H. B. BIGELOW & CO.
C. COWLES & CO.
C. S. MERSICK & CO.
SPENCER & MATTHEWS.
PAUL ROESSLER.
E. S. WHEELER & CO.
ROLLING MILL CO.
APOTHECARIES HALL.
E. A. GESSNER.
AMERICAN TEA CO.

Meat & Fish Markets.

W. H. HITCHINGS, City Market.
GEO. E. LUM, " "
A. FOOTE & CO.
STRONG, HART & CO.

Hack and Boarding Stables.

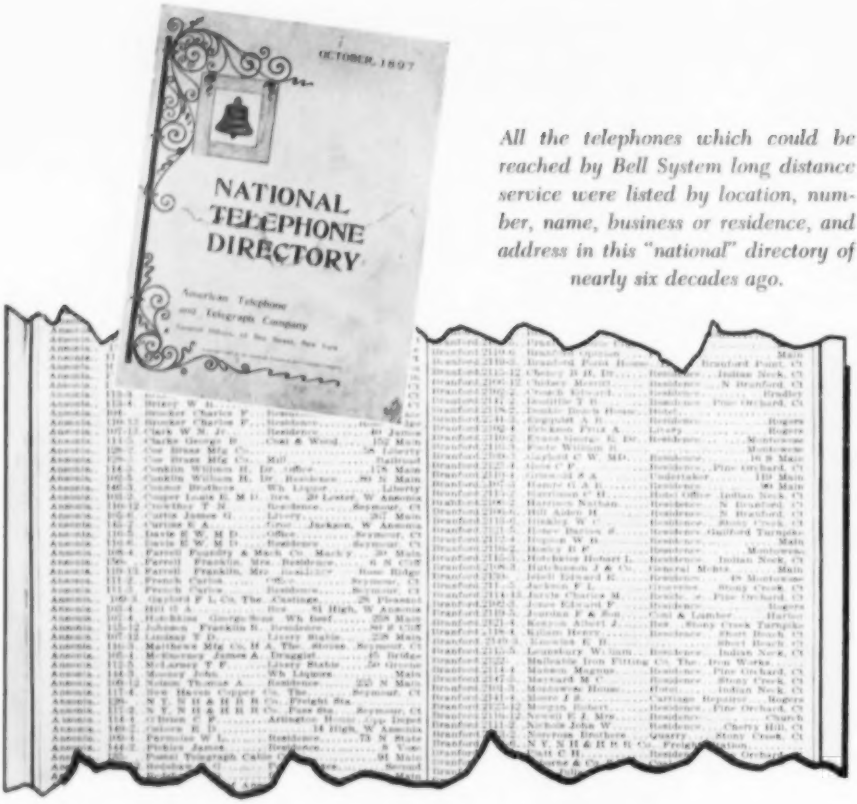
CULTENDEN & CARTER.
BARKER & RANSOM.

Office open from 6 A. M. to 2 A. M.
After March 1st, this Office will be open all night.

The first telephone directory, issued in New Haven, Conn., less than a month after the world's first commercial telephone exchange was established there.

by name and adding another numeral. The former was chosen in most cases, because it was considered to be simpler—although, if all the future involvements both technical and emotional could have been foreseen, the less colorful but more anonymous all-numeral method might have been selected instead.

Initially, the naming of central offices was a pretty uninspired job. The first office was almost inevitably called "Main" and the second "Branch." There are a good many "Mains" left but "Branch" has almost entirely disappeared because more than one branch office had to be opened. Perhaps on the occasion of the opening of the second branch office in some city, an explanation was made to all of the "Branch" subscribers who were going to be changed to "North" to the general effect that progress required this change but with three other points of the compass still left it was highly unlikely that any further changes would occur. In some cases this turned out to be correct, and many "Norths" are still in existence, as well as some "Souths," "Easts," and "Wests." However, as we shall see, even some of these staunch and apparently indestructible names became casualties of the shifting nomenclature tides.



All the telephones which could be reached by Bell System long distance service were listed by location, number, name, business or residence, and address in this "national" directory of nearly six decades ago.

When the compass points were exhausted there came the question as to what avenue of approach would be used next. Well, there was geography and there was history, natural as well as local and national. Why not try them? The resources here were practically limitless, and in the earlier stages it was relatively simple to name the new offices. From the geographical approach came "Bowling Green," "Fairfax," "Longbeach," "Trinity," and many others. Natural history provided "Cherry," "Hickory," "Orchard" and a few "Filberts." National history produced "Adams," "Franklin," "Hancock," and "Plymouth."

Not many problem situations so far. It didn't matter if the same name were used in different cities, and these early names were generally simple and easily understood. However, when the naming trail led into locally significant names, such as "Tashmoo," "Glebe," "Esplanade" and even "McAdoo," some difficulties were encountered, although these were limited to those occasioned by a distant operator becoming tangled up in the pronunciation or spelling of a strictly local name.

About this time, a process of determining the phonetic value of office names came into use. A list of proposed names, secured from all possible sources, was prepared and then tested to see how good they were. In making the tests, operators were given the lists and proceeded to read the names over a circuit to other operators, who recorded them as they were understood. The names that were most frequently misunderstood, misspelled, or that required the most frequent repetition, were eliminated. However, since the testing took place en-

tirely within a local area, there still remained many names which, while understandable in that vicinity because of their local significance, were destined for the casualty list with further developments in the telephonic art.

With the progress of dial service, some new factors were introduced into the name selection procedure. A look at the dial will show some of these factors. One that is immediately apparent is the absence of a "Q"; therefore, no more "Quincy's" or "Quarry's." The letter "Z," if it appears on the dial at all, is placed in the tenth opening, the one used to dial "Operator," and so no names beginning with "Z" are usable. The use of "Zenith" is thus precluded, and it's probably just as well, for the possibility of its opposite, "Nadir," suggests itself—which raises an irrelevant speculation as to why "Zenith" is so much better known than "Nadir."

In the earlier days of local dialing, the first two letters, followed by the numerals, were dialed. When this began, some name revisions had to be made. There could not be a "Market" and a "Main" in the same city, nor an "Adams" and a "Beacon." Sometimes this meant the elimination of a name that had been in effect for a long time, and such an undertaking was not without its problems—to use an understatement.

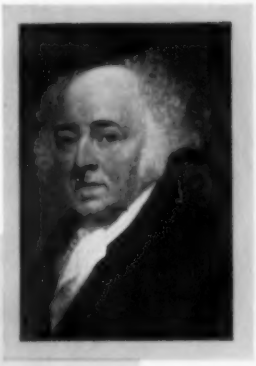
With the two-letter approach (and here maybe another look at the dial is advisable), there were and are 64 possible combinations. The letters begin in the second opening and continue through the ninth. There are, then, eight possible first letters

Listings in the current Manhattan (New York City) alphabetical four-column directory illustrate the 2–5 numbering plan.

"Franklin" and "Bowling Green" are historic names which have served as central office designations and have thus become telephone number prefixes.

to be combined with eight possible second letters, or $8 \times 8 = 64$. Why only eight and not ten? The tenth opening's unsuitability has been previously accounted for and the first opening, occupied exclusively and aloofly by the numeral "1," was not deemed at the time to be sufficiently eligible to be endowed with letters because of a hovering spector called "preliminary impulse." In an era when most of the instruments were of the erect "desk stand" type, the process of unlatching the receiver from its claws was calculated to cause an unwanted impulse to be transmitted to the dial machine. The machine was arranged to absorb this preliminary impulse, and as a result the first opening became, and still remains, unlettered.

Of the 64 possible combinations, there were and are four which are ordinarily not used because of the relatively few usable names that could be developed from them, i.e.:



"Adams" and "Trinity" have also become familiar to generations of telephone users as identifying designations for telephone numbers.

Openings	*1st Letter*	*2nd Letter*
5–5	J,K,L	J,K,L
5–7	J,K,L	P,R,S
9–5	W,X,Y	J,K,L
9–7	W,X,Y	P,R,S

If completely mined, these combinations could produce "Klamath," "Kringle," "Ylang" (a Philippine tree), and "Wrath," all of which lack in various degrees the required characteristics.

With these four out, the possible names for a city were reduced to 60, and in some cases this was even further reduced by other factors. For example, in one case "Georgia," a 4-3 combination, was so often dialed as GA that it became necessary to strap the 4-3 with the 4-2 combination so that, regardless of the spelling proclivities of the calling customer, the call arrived at the correct place. However, in so doing, another suitable name, "Hamilton," using the 4-2 combination, became unavailable.

In a few of the very large cities, three letter dialing was introduced. Theoreti-

The "Open Sesame" to most callers: a standard telephone dial. The letter "Q" never appears, and this type lacks the "Z" also.

cally, this resulted in there being a maximum possibility of 512 names: $8 \times 8 \times 8$. Impossible spelling combinations reduced this to about 325, but still this seemed to be adequate to handle the growth for an indefinite time.

Now that the outside limits seemed to be settled, the procedure of selection of names that met both the phonetic and dialing requirements became a matter of good judgment supported by technical knowledge. Locally meaningful names were retained wherever they met the requirements, and all seemed well and secure. Tests of names were made every now and then so that there would always be thoroughly acceptable ones available when a new office opened.

Accentuating the Naming Difficulties

BUT ALL was not well and secure. Growth continued,—enough to be threatening to the peace of mind of the nomenclature people. And then there was added to this relatively mild state of disquiet the full impact of intercity dialing by operators. This was an enormous step forward in the improved handling of long distance calls, but brought with it an accentuation of the naming difficulties.

Passing a name over a circuit by voice is quite different from dialing the first three letters of the name. In the former case a call for a "Taylor" number, for example, generally arrived at a "Taylor" number. But with a distant operator doing the dialing, the call might start off as TAI (for a not unforgivable "Tailor") and land, if it landed at all, at an entirely different number. This difficulty with the orthographic placement of the third letter, together with a demand for more and more central office names, resulted in a change from three letters and four numerals to two letters and five numerals. This is referred to today as the 2-5 plan and is the basic structure of all local numbering plans.

With a numeral substituted for the third letter (the numeral in reality being part of the central office name), not only were the operator spelling difficulties somewhat eased but also the number of possible combinations and hence office names was increased, this time to 540. Why 540? Starting from the 60 described earlier, each

multiplied by 10 gives 600. However, the tenth opening containing the numeral "0" and the "Operator" service code is not generally used and therefore it is 60 × 9 = 540.

It was about at this time that the possibility of intercity dialing by customers became a probability, and it was obvious that something further in the central office naming field had to be done. It was one thing for the natives of a city and all telephone operators to dial a particular number in that city, but it was quite another thing for all people everywhere in the United States and Canada to dial that same number. For that is, of course, what the plan of customer dialing of long distance calls sets out to do: to enable these 50-odd million customers to dial each other easily and simply.

"A Multi-Office Country"

UNDER SUCH a concept, the two countries become in effect a huge multi-office city, and a numbering plan to meet this condition had to be devised. As a first step, the countries were divided into areas each designated with a three-numeral code. These areas are geographical in that they follow state and province lines, but in the more thickly populated of these areas two or more three-numeral NPA (numbering plan area) codes have had to be assigned. This is so because no more than 540 central offices can be contained within one NPA code. Each central office within an area must have a different designation, consisting of the first two letters of the name and a numeral, so that when a call gets to the right area it will then get to the right office in that area.

By looking at the NPA map it can be seen that the codes have either a "0" or a "1" for the middle numeral. This plan of coding, termed the X0X and X1X approach, had as its original concept that those containing 0 would be used where the entire state could be contained within one code, and those containing 1 would be assigned to states where more than one code was necessary. Thus, when the intertoll dialing facilities were fully available, a call to any place in Nevada could be handled on a "destination" basis by the operator's or the customer's dialing 702, followed by the two letters and five numerals of the called telephone. On calls to multi-code states, the proper code would have to be known or be obtained from an operator in much the same manner as telephone numbers are obtained from Information now.

It seemed to be a good plan, and one that had plenty of capacity. The X0X and X1X approach resulted in there being 152 possible combinations available. How? Neither 1 nor 0 are used to start a code, so in the X0X class, there are 8 different numerals to start the code and ten different numerals with which to finish it; therefore 8 × 10 = 80. Similarly, in the X1X class; but here codes ending in 11, of which there are eight, cannot be used since they are already in use for local service codes: 211 for Long Distance, 411 for Information, and so on. Accordingly, there are only 72 available in the X1X class. And 80 + 72 = 152.

It seemed like a large enough figure, this 152, when there are only 48 states and 9 provinces to consider. Again, however, because of continual growth and resulting new offices, the possibility of exhaustion must be foreseen. Recently, the 100th and 101st codes were assigned. The X1X class is being used up faster, and consequently there are a few states (e.g., Florida and Georgia) which have a code in each class. To meet the possibility that at some future

time all 152 would be used up, new equipment will be designed to handle NPA codes of a X01X class which will make 72 more codes available and, with luck, suffice until sometime beyond the year 2000.

The Necessity for Change

To RETURN to the naming of central offices within each numbering plan area and the need for each office in the area to have a different designation, it was obvious that some names had to be changed. This, on occasion, required some nice judgment and diplomatic negotiations, especially when there were two cities in the same area having an office with the same name.

Also it was apparent in the interests of simplicity that uniformity of numbering must be the objective; that is, each number must consist of two letters and five numerals. Then came the question as to what these two letters should be. In the smaller places, which had never grown beyond one central office, why no retain the locality name as the name portion of the number? Why not, indeed? The answer lies in the ingeniousness and enormous fertility of mind with which our towns and villages have been named. These, together with names of Indian descent, have resulted in a formidable array of appellations which, while colorful and significant, are insurmountable obstacles to an easy nation-wide dialing plan. Among them are Koeponick, Ephrata, Illahee, Scruggs, Hye, Quiggleville (no Q's available) and Zia (and no Z's). Good names, but they won't do.

To meet this complex situation there has been developed for each of the 60 possible letter combinations, four or five names which seem to meet all the requirements. They can be spelled and, what is more important, they can be dialed. Some appear on the opposite page, and there are others for each combination. The point about all of them is that they have met the various tests and that they can play their part in furnishing an ever-improving service to the customer.

The three-numeral codes of the NPA map as designed for the United States and Canada.

2-2—Academy	5-3—Jefferson
2-3—Adams	5-6—Locust
2-4—Chestnut	6-6—Mohawk
2-5—Alpine	6-8—Murdock
3-6—Emerson	7-4—Pilgrim
3-7—Drake	7-7—Prescott
3-8—Dudley	8-2—Talbot
4-2—Garfield	8-6—Townsend
4-3—Hemlock	9-3—Webster
9-8—Yukon	

Since the same names can be used in different numbering plan areas, telephone numbers in the different parts of the country are beginning to sound increasingly similar. Sentimentally this may not be too good, but telephonically, it is fine. Many a full-flavored local name must fall by the wayside as the changes are gradually made, and sometimes it is with considerable regret that a memory-laden name must be relegated to limbo. But, when in so doing it becomes easier for anyone to talk with anyone else anywhere and at any time, it is not too inappropriate to echo the Bard and ask, "What's in a name?" Given an opportunity, some telephone people would be quick to reply "A lot more than meets the eye."

Over the past several years considerable progress has been made toward reaching the goal of full 2-5 numbering, a goal that is necessary for full nation-wide customer dialing. Today, about 20 million telephones, or nearly 40 percent, are on a 2-5 basis, with another 20 million planned by the end of 1957. These statistics portray the magnitude of the job; the complexities become apparent only by examining the past. While the future course of the basic numbering plan appears fairly well established at this time, no telephone people, and most particularly those who deal with these problems, would want to guarantee that there would be no further changes.

". . . TO SPEED THE SPOKEN WORD TO DISTANT PLACES"

He found the means to speed the spoken word to distant places.

So reads the inscription on the bronze plaque honoring the telephone's inventor, Alexander Graham Bell, which was unveiled in the lobby of the A. T. & T. Building in New York on November 9, 1954. The bas-relief, by the eminent American sculptor Paul Manship, shows Mr. Bell as he was in 1875, seated at a small table and with the first telephone before him. The plaque was unveiled by Mr. Bell's two daughters, Mrs. Gilbert Grosvenor and Mrs. David Fairchild, in the presence of others of his descendants and of several hundred Bell System employees.

In his brief address of greeting which opened the ceremonies, A. T. & T. President Cleo F. Craig said in part, "I shall not try to repeat to you the story of Mr. Bell's invention of the telephone. It is enough to say that by a masterpiece of sustained research, he succeeded where others had failed. He made experiment after experi-

Dr. Bell's two daughters, Mrs. Gilbert Grosvenor and Mrs. David Fairchild, stand directly beneath the figure of their famous father, with members of their families ranged on either side.

ment, and through keen perception and logical thought, he at last opened the door that before him had always been closed. His achievement changed the world. We who work to provide telephone service take a special pleasure in honoring Mr. Bell. But I think that in placing his likeness here in its place of honor, we shall also bring benefit to ourselves. It is good to be in the presence of a great man, and the feeling of a great man's presence is in this work of art."

After the curtains had been drawn, James Wheaton, of the Public Relations Department, read Mr. Bell's early prophecy of the future of the telephone into a model of the original telephone, then into a modern telephone. The Bell solar battery, one of Bell Telephone Laboratories' latest developments, supplied the power for the modern telephone. Daryl Chapin, the electrical engineer on the three-man inventor team, held the solar battery to the sun and demonstrated that the battery transforms light from the sun directly into useful electrical energy.

Speaking "by the light of the sun," Walter Hampden, the distinguished actor, read John Milton Caldwell's tribute, "The Vision of a Man Named Bell." The Bell solar battery was connected to a tiny FM radio transmitter using transistors in place of vacuum tubes, and the words were picked up by a regular FM receiver connected to the loud speaker system.

[A painting of the Bell plaque is shown as our frontispiece (p. 208), and the last stanza of "The Vision of a Man Named Bell" is given on the back cover.]

Martin Myers (left), Bell's great grandson, holds a replica of the first telephone. At the right, Mrs. Fairchild and Mrs. Grosvenor stand beneath the plaque with President Cleo F. Craig.

A business office service representative brings better living to her customers and additional revenue to her company by promoting complete telephone service

OPPORTUNITIES UNLIMITED!

JACK CLARK

Business Office Engineer, O. & E. DEPARTMENT, A. T. & T. CO.

THE SCENE: A telephone company business office.
THE TIME: A bright crisp Winter's morning.
WE NOTICE an attractive girl in her early twenties talking on the telephone.
LET'S listen to what she's saying:

Well, Mrs. Edwards, I think you'll find that three telephones in a two-bedroom ranch house are certainly not too many—one in the kitchen, one in the living room, and one in your bedroom for those night calls. They'll save you lots of time and trouble and will cost only $2.00 a month more than you're paying now. You'd more than triple the value of your service.

These remarks are part of a discussion between Betty Williams, business office service representative, and one of her customers. Service representatives in every telephone company business office, as Betty will tell you:
arrange to install a new telephone for you; make sure that the telephone service you have is just right for your needs; look after moving your telephone; and answer any questions about your bill or any other telephone matters.

Now they are taking on a new challenge —selling to residence and small business customers telephone service that is really complete.

Sales and servicing people, installers, repairmen, tellers, and lots of other telephone folks are also taking on this challenge. Each has a share in the undertaking, the service representatives' being based on the nearly 100,000,000 conversations that take place each year between Bell System service representatives and the public—100,000,000 opportunities to discuss really convenient telephone service.

BETTY has been a service representative for about two years now. Her training and experience have developed in her a desire to see that her customers get the most out of their telephone service. To be sure, that unhappy feature of the post-war period, shortage of equipment due to phenomenal growth in the telephone system, kind of held her back from always being able to provide the right kind of telephone service, when and where needed. She did her best to help her customers, but all the while she hated to say

As Betty points out, "Complete telephone service is just about the biggest convenience bargain you can get these days."

"Lots of times the plant man is able to spot sales opportunities that I can't see—and he's also able to back up my suggestions."

SCENE FROM THE MOTION PICTURE "FAMILY AFFAIR"

"Her very own telephone—a real thrill for any teen-ager—and practical too!"

"Morning meetings with our Supervisor give us a chance to swap experiences and to get the latest ideas on selling better telephone service."

"no" and just longed to be able to show them what really modern and convenient telephone service could do.

However, Betty is a lot happier now. The telephone company's tremendous construction program has really paid off, and shortages of telephone equipment are becoming a thing of the past in her town. Except for a few small areas, there are sufficient wires and cables to furnish individual lines to present customers as well as to take care of any new ones. There are better supplies of telephone instruments and other items too. This has been made possible by the Western Electric Company, manufacturing arm of the Bell System, which has not only produced the vast quantities of telephone material needed to overcome past shortages but is pushing ahead with the production of new and improved types of equipment to insure that everyone may benefit from the advantages of better telephone service.

Now Betty really feels she can do a job for her customers and her company. She knows that relatively few of her customers have had the opportunity to find out what complete telephone service means, that many have been conditioned to believe that telephones are always hard to get, and that, perhaps because of this, they think that one instrument in the hall is all there is to telephone service. But Betty says:

For real convenience you should have telephones throughout the house.

Why run when you can simply reach?

Costs too much?—Why, it's just about the biggest convenience bargain you can get these days.

People don't share their cars nor their washing machines, even though they cost a lot and are only used a part of the time, so why should they share their telephone line?

Betty knows that the telephone business will benefit from her efforts to give her customers better telephone service. For instance, two of the items that Betty sells are extensions and better grades of service. In addition to the relatively stable revenue that they bring in, the better telephone arrangements they represent make telephoning easier on both local and long distance calls, thus helping message revenues. They help answering as well, which improves completion of calls, speeds answers, and reduces equipment operating costs. Then too, customers soon find that conveniently located telephones are really indispensable. They want to keep those telephones through bad times as well as good. Betty wants her customers to think of complete telephone service the same way they think of other everyday necessities like electric power—*you just can't imagine being without it.*

Now YOU CAN BET that all these wonderful opportunities to provide better telephone service just didn't materialize out of a clear blue sky and land right in Betty's lap one morning. No Sir! Betty is part of a whole new concept of "telephone merchandising"; the concept of seeking out the customer's needs and selling him the kind of telephone service that he should have—even in the face of some equipment shortages.

The Bell telephone companies' primary interest always has been to provide the best possible telephone service when and where wanted. However, not since the 'thirties have telephone companies been able to actively "sell" telephone service; and in those days there was plenty of equipment. Too much, in fact. Today, conditions are quite different. Outside plant facilities and other types of telephone

"With the modern trend to outdoor living, my customers find that outdoor bells and portable telephones really fit in with their activities."

equipment are adequate in most places, but there are few surpluses. In some locations and in some items shortages still exist, despite the best efforts to eliminate them.

The times are different, too. Nowadays, telephones are a powerful factor in everybody's lives, and the Bell telephone companies have an obligation to make sure that communications facilities keep pushing ahead with the general progress in our living. A forward-looking policy like this is the foundation of our future prosperity. It means that we cannot wait for every shortage to end, for every problem to be solved. We must get out now, find out what the customer really needs, anticipate his wants, tell him what we have and what it will do for him. In short, make and sell the best possible telephone service whenever and wherever we can.

PEOPLE APPRECIATE the achievements of the telephone companies, but they don't always realize the obstacles that have to be overcome. You don't need to tell Betty about that. She has got to make sure that spare cable facilities are available when she recommends a better grade of service. Delivery dates on colored sets vary from time to time. Other problems arise. But she still finds plenty of opportunities to recommend more and better telephone service to her customers, and she doesn't intend to pass them up.

Perhaps this a good place to find out how Betty feels about "selling" telephone service. Here's what she says:

I know we all think about "selling" and like to talk about the "sales" we've made, but selling telephones is not the same as selling motor cars or shoe laces. You see, when I "sell" an extension, the customer doesn't plank down his money and walk off with it under his arm. He agrees that he needs that additional telephone and that he will pay us a small amount each month provided that we put it in for him and keep it working all the time. In order to make my "sales" stick, the things I recommend have to show my customer how wonderfully convenient telephone service can be. I like to feel that I've done him a really good turn.

Betty does well at this because she has received the necessary training and because the business office supervisor to whom she reports knows her business and is therefore able to give Betty the help and guidance she needs. Her supervisor's training included several days of handling customer calls, both incoming and outgoing, so that she was able herself to sell customers the better service that they needed. This actual experience has enormously increased her understanding of the sales job and has enabled her to provide Betty with really effective help. She does this by discussing with Betty difficulties that have been encountered, by drawing on her own sales experience for the best ways to handle various situations, and by short, simple sales discussions during regular morning meetings.

The training Betty has been given was designed to help her determine from her customers the kind and amount of telephone service that would best fit their requirements. She has learned not to be at all hesitant about using such questions as:

Mrs. Brown, is yours a two-story house?

How many people are there in your home?

Are there many people using your telephone?

Where is your telephone located now?

She knows she doesn't have to ask them all. Sometimes she won't need to ask any, because in the course of talking with her

customers a lot of useful information turns up voluntarily.

She practiced picking out opportunities by making some actual sales calls from the classroom. She also learned the best way to present her recommendations to her customers. Her reaction?

Gee, this is fun. I never thought it would be so easy!

She found it easy because she knows and believes in the value of complete telephone service. All she is doing is passing on to her customers the facts about the comforts and conveniences they can so easily afford.

Also, in the training class Betty saw and handled some of the various items that are available for "custom-tailoring" telephone service, such as:

Telephones in a variety of beautiful colors.

Portable telephones.

Additional listings in the telephone directory.

Telephones with a special volume control—for the hard of hearing.

Cords that stretch and won't tangle.

Extra bells for the patio or garage.

The opportunity to "play" with these and other items of equipment helps Betty to recognize quickly opportunities for their

"I sold an extra listing to one of these girls so that her friends could keep in touch with her while she's living with her aunt."

SCENE FROM THE MOTION PICTURE "FAMILY AFFAIR"

"I said to Mrs. Jordan, 'The office your husband works in has a telephone—so why shouldn't you have one in the kitchen you work in?' She says now she couldn't get along without it."

use and to talk with conviction to her customers about their usefulness. The more Betty knows about all-'round telephone service for the home, the more helpful she is both to her customers and to the company. The training course also included films—one showing service representatives discussing and recommending telephone service plans to customers, and another that demonstrated how invaluable complete and convenient telephone service can be to people in the course of their normal day-to-day living.

What has this training and supervision done for Betty? How does she go about her daily job of bringing better telephone service to her customers? Let's go back to the business office and see how things are working out. Betty is talking to Mrs. Meyer, who is moving to a somewhat larger house than she has lived in up to now. It is a two-story, three-bedroom house, of conventional design. Mrs. Meyer has called the Business Office to arrange for telephone service at her new address. Betty says:

Mrs. Meyer, I've got just the thing for you. It's a plan for telephone service designed for homes just like yours. It includes a private line with telephones on both floors especially located for your convenience. You'll be amazed at the amount of time and effort it'll save you.

Mrs. Meyer had been thinking in terms of just one telephone, and was a little dubious about having more. After all, she'd always gotten along with one, but Betty told her:

When you come to think of it, Mrs. Meyer, having a telephone in each area of your house—what you might call the working, living and sleeping areas—is almost a minimum for really good service. You see,

"People whose hearing is impaired really appreciate this telephone with the special volume control."

in the working area, your kitchen, we'd put a wall-type telephone with a cord that'll stretch but won't tangle; in your living room, a telephone on a conveniently located desk or table; and one in your bedroom—with a dial that lights up, which is just perfect for night time use.

"Well, the living room and the bedroom ones might appeal to my husband," replied Mrs. Meyer, "but I don't know that he'd go for the expense of one in the kitchen."

Why, Mrs. Meyer—an extension telephone is not expensive, only $1.00 a month. If you have it installed at the same time as the main set, there's no extra installation charge. Besides, you'd love the one in the kitchen. No worrying about dinner burning while you run to answer the phone, and it's so handy for shopping—I'm sure Mr. Meyer wouldn't mind.*

Mrs. Meyer thought it sounded attractive, but she didn't know whether she should talk to her husband or not. Betty added:

You know, the whole plan is very inexpensive—only $3.25 a month more than you now pay for your party line . . . plus a single charge of $5.50 to install it now. This save you money, because extension telephones ordinarily cost $3.00 each to install.

That seemed reasonable enough to Mrs. Meyer and so she decided to try the plan that Betty recommended. It worked out fine, too, as she told Betty some time later:

"I'm so pleased with our telephone service. I had no idea how wonderful it can be to have the telephones right where they're handy. No more running up and down stairs for me—and my husband is delighted to be rid of our party line."

Betty has become an expert at diagnosing the telephone needs of her customers. It gives her a lot of satisfaction, too, to help make people's living easier and more comfortable. Take the other day, for instance. She was talking to Mrs. Gregory, who mentioned that her hearing aid didn't help her when she was talking on the telephone. Betty said:

Why, Mrs. Gregory, we have just the thing for you. It's a telephone with a special button to raise or lower the volume that helps most people with hearing difficulties to hear much better.

Another time, a mother with a new baby called and said: "You'll just have to do

* A new practice recently introduced in Betty's Company.

something about our telephone. The bell is always waking the baby up and he's getting so cranky. We have the phone in our bedroom and you'll just have to take it out, or cut off the bell or something. I'm just at my wits end!"

Betty was ready for that one too:

Why, that's a shame; but don't worry, we can fix it up. We could very easily disconnect the bell in that telephone and put one of our new wall telephones in your kitchen. With a new baby, you must spend a lot of time in the kitchen and this way you could do your telephoning without fear of disturbing him—and you wouldn't have to do without the convenience and protection of your bedroom telephone either.

Another problem solved, another customer made happier by Betty's understanding of complete telephone service.

Some of Betty's customers live in small apartments. Most of them don't ordinarily think that extension telephones are necessary, until Betty explains:

Often the distance from the kitchen to the living room or bedroom is as great in an apartment as in a small house. Getting out of bed or out of a nice comfy easy chair to answer the telephone is always bothersome. Telephone service in an apartment should be designed for convenience, just as the apartment itself is.

Occasionally, Betty gets a disconnect request from one of her customers who feels that the telephone is an unnecessary expense. This worries Betty. As she points out:

Lack of a telephone can cause many problems. There is nothing like the reassurance of a telephone close at hand when you're awakened in the middle of the night by a strange noise, or when you need a doctor or suspect a fire. Keeping in touch with friends is much more difficult without a telephone, and if you're looking for a job, why it's a must. *To me, being without a telephone is like being without electric lights.*

YOU CAN SEE that Betty has to be a very versatile gal. A great deal of time and thought goes into the training and supervision she receives—and rightly so, for this is really big business. Recent results show that sales are being made by service representatives in the business offices to the tune of $25,500,000 annual revenue per year. Among the items that produce this healthy chunk of revenue: 700,000 extension telephones, 145,000 directory listings, 550,000 upgrades, to name only a few. And, as Betty points out—*we're just getting started.*

"Let us spray"—with chemicals—may reduce brush on rights-of-way to a point where it can be controlled during routine inspections of the lines

NEW CHEMICAL SPRAYS EASE RIGHT-OF-WAY CLEARANCE

STANLEY A. HAVILAND

OUTSIDE PLANT SECTION, O. & E. DEPARTMENT, A. T. & T. CO.

"VOICE PATHS" IS A figure of speech familiar to most telephone people. It is one way of referring to the telephone cable and open wire lines which span the countryside. But few of us realize that these paths remain open to speeding voices only because actual physical paths are maintained for them. These physical paths are known as rights-of-way, and are recognized most commonly as the cleared swath of a cross-country pole-line route occasionally seen striking off over a distant hillside. These are the main telephone routes extending over many miles to connect the country's major centers of population. Of even greater total mileage are the roadside rights-of-way tying together the various local exchanges.

Why is it necessary to keep these paths clear of brush? The answer is not far to seek. Trees and shrubs capable of growing to the height of open wire and cable on poles can cause trouble through contact and by falling limbs. And if there is trouble, lower-growing brush—wild grapevines, blackberry and raspberry canes, for example—block the path of the repair crews. Poison ivy and other noxious plants lie in wait for the unwary. Boulders, gullies, chuckholes and other booby traps are screened by dense brush and make progress along the right-of-way a risky business for man or truck. The problem is common to all the companies of the Bell System. Were nothing done to keep the "way" clear, the conditions described would exist on some 350,000 miles of pole line throughout the country.

Of course, something has always been done. Ever since the first line was built beyond city limits, crews of workmen have at intervals been going over the routes with axes, brush-hooks, and saws, cutting the brush and piling and burning it. In recent years, the people responsible for right-of-way maintenance have experimented with mechanization of the job. Bulldozers and steel-toothed scarifiers have been seen pushing over scrub growth, yanking it out by the roots and shoving it over to the side of the right-of-way. In some cases, this was followed by disc harrowing to chop up and cover the remaining litter. There is even a tank-like device which rolls up and down the line and literally beats the brush to pieces by means

of a series of slashing flails, in a manner similar to that used by the British to explode enemy land mines in World War II.

But even the best of these methods has its defects. There was a time when idle farm labor could be used during the off-season for low-cost manual clearing of right-of-way. With the increasing use of power tools on farms, this labor pool has dried up and labor costs have mounted as a result. The methods employing heavy power equipment, while spectacular and capable of doing a good initial job of clearance, churn up the soil. This is undesirable, since one objective of good maintenance practice is to develop and preserve a ground cover of grasses, low growing shrubs, and other vegetation as a means of preventing soil erosion. Elsewhere, these methods had the effect of creating a finely mulched seed bed, ideal for encouraging new brush to start.

Cutting brush produces no permanent effect in most cases. The plants immediately try to recover the balance between the portion below ground and that above. Cut a single stem, a red maple sapling, for example. Next year you will have maybe three smaller ones. Cut these and the following season you find six or seven more starting. Each year the size diminishes but the number increases. In the end you face a bushy obstacle more formidable to passage along the right-of-way than the original tree. The same is true of many species.

BRUSH THAT THRIVES under conditions along the right-of-way is tough. Some species of growth found there will continue to grow if even a small bit of live root is left in the ground. While we do not as yet have a sure method for handling these more persistent ones, the appearance on the market some years ago of chemical weed killers has pointed to a way of controlling most of the types of growth found along our lines. These chemicals had the ability to kill not only the growth above ground but also, with most plants, to kill the roots.

The exact manner in which these mate-

rials cause the death of a plant is not yet known. Although studies have been under way for some time, the problem remains a complex one, similar to others in nature which are still unsolved after many years of research. For example, chemists have worked intensively for over 100 years trying to find out how a plant makes sugar, but only now are they beginning to understand the process. Tests have shown, however, that the brush-killing chemicals do enter the plants and get into the channels through which fluids move up and down within them. Once within the plant, it appears that certain of the chemicals may have some upsetting action on the plant's food processes. Chemical changes observed in the elements which make up the plant tissues and the occasional appearance of abnormal growth effects seem to point in this direction.

The development of the chemicals was by stages, a process which is still going on, by the way. Among the first found was a chemical for killing poison ivy. This turned out to be a general killer, and would kill almost any plant it was sprayed on. Another chemical was useful on lawns and in agriculture to kill broad-leaf weeds without harming grasses or grain crops. A close relative of the latter was discovered which would kill various types of briers.

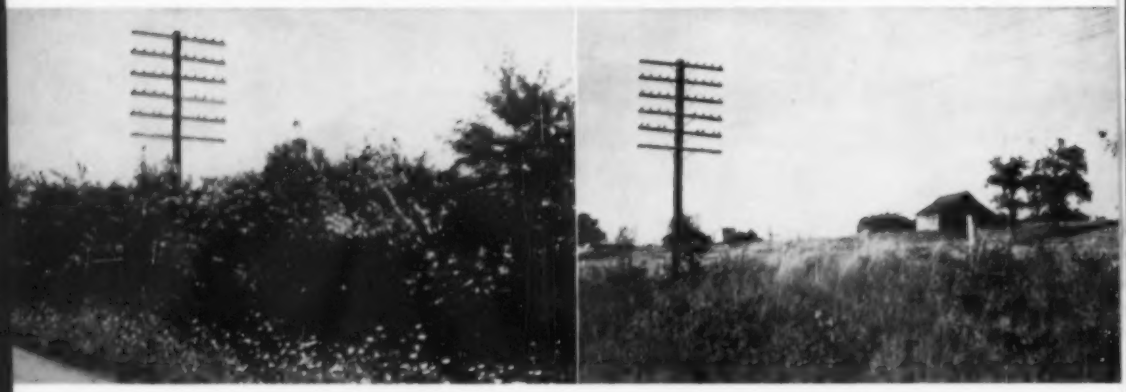
When used for their intended purpose, these chemicals were applied in comparatively dilute form. Later it was observed that, when administered in stronger doses, they had the power to kill the woodier forms of plant life—trees, shrubs, vines and the like—still without having a permanently harmful effect on the growth of grasses.

In the use of these chemicals on telephone rights-of-way seemed to lie the answer to the problem of dealing with the brush nuisance economically yet without any of the shortcomings common to previous methods. If we could spray the right-of-way at a cost comparable with cutting, and each time we sprayed we killed something, we might look forward to the time when we would have no more clearance problem. The right-of-way would be all grass and would maintain itself. We know now that this is practically an impossibility—there will be reinvasion of brush from wind-blown seeds and other sources. But even if we never reached this ideal situation, the prospect was sufficiently encouraging to warrant a start.

A FURTHER INCENTIVE to outright elimination of scrubby growth by chemicals, particularly on roadside right-of-way, is provided by the promise of vastly improved scenic and utility values in rural areas. Roadside brush is condemned by farm extension services as causing unsightly fence rows, ditch banks, and roadsides, and as an accident hazard through its obstruction of vision at farm lanes and crossroads. Clear roadside areas also mean more productive acres for the farmer by permitting him to plant closer to the lines. Highway forestry supervisors agree that the safety, convenience, and pleasure of motorists are benefited by brush-free roadsides, and they encourage the judicious use of chemicals for this purpose. Thus, in improving our own housekeeping methods, we are also assisting farmers, highway commissions, and park authorities in their work.

It must be admitted that trials proved the first chemicals, as used in 1946, almost worthless as far as their effectiveness in killing off brush was concerned. Early users , overrating the potency of the chemicals and underrating the importance of thorough application, at first applied the

The revealing effect of one spray application along a telephone right-of-way in Tennessee.



August 1947 September 1953

Reduction of brush along the Burlington–Kansas City route through spraying.

materials sparingly and in dilute form to the leaves of the plants only. The green of the foliage would begin to fade as a result of the chemical activity. Eventually the leaves would drop off, and a successful outcome seemed to be promised. But a revisit the following spring would show nearly everything coming along flourishingly. Only the less populous susceptible species had been killed, and the best that could be found in the tougher dominant varieties was that the tips of the branches had been killed back a few inches.

What was wrong? If treatment were continued in this fashion, it might be possible eventually to worry the plants to death, but this would be too expensive. That some plants were killed outright was proof that the chemicals were not hopeless. The odd thing was that there were instances where only a tip kill was produced on one specimen, whereas alongside was an identical plant dead to the ground line.

There followed a scramble among manufacturers, researchers, and users to find the solution. First, the strength of the chemicals as supplied was stepped up and stronger spray solutions were applied. This had the disastrous effect of stripping the leaves off the plants before sufficient chemical could enter their systems to produce results. As soon as the plants could grow new leaves, they were as good as ever.

Then it was discovered that certain chemicals affected one group of plants more than others, and so combinations of chemicals were put together so that they might complement each other with their special properties. This helped; a wider variety of plants was being seriously affected by the foliage spray, but the results were still erratic.

NATURE CANNOT BE HURRIED. Sometimes the full effects of spraying are not apparent until the plants have passed through the first or even the second growing season following the treatment. So it takes that much time to find out that everything is not as it should be before something else can be tried. It is no wonder, then, that, with the passage of time being measured in seasons and money being spent with no real results to show for it, serious doubts began to arise about this new method of clearing right-of-way.

But gradually the outlook began to improve. Reports began coming in of good rates of kill with chemical applied in water as foliage treatments, much in the manner of earlier sprays. Evidence was also at hand to show that resistant plants could be killed at any time of the year by applying stronger solutions of the chemicals in oil to just the stems or trunks at the ground line and to any portions of the roots appearing above ground. From this came the idea that, with a given strength of spray solution, successful treatment depended almost entirely on the thoroughness of applying the spray.

Investigation of reports of successful foliage applications during the growing season showed that, contrary to the original idea that plants could be killed simply by spraying the leaves, the only way to get more than a top kill was to spray the whole plant. This explained those baffling cases of identical plants standing side by side, one dead, the other hardly touched. The dead one had got "the works." Its leaves, twigs, stems and the parent stump had been doused thoroughly. The live one had got only a modest wave of the spray nozzle.

Discovery of what was required to do a generally effective foliage spraying job helped to revive the confidence of the supporters of chemical control of brush, but it did not provide the whole answer. There is hardly a stand of brush anywhere that does not contain some stubborn species. Willows, birches, black gum, sycamore and alder, for example, are relatively easy to control. But they are rarely found on right-of-way except in the company of one or more of such species as red maple, ash, basswood, hickory and some oaks. These are among the difficult types, particularly if sprouting from old stumps left from the original clearing of the right-of-way.

FROM THIS SITUATION gradually evolved the two-stage treatment now coming into use. The density of brush on a right-of-way that has been cut over many times makes it impracticable to expect that every single sprout will be sprayed thoroughly the first time over. Taller growing brush shields the lower growth. To hit every stem would mean that the men doing the spraying would have to force the tall brush aside to reach the plants below it. Consequently, the first spray is looked upon simply as an opening-up operation in which the objec-

A spray rig of 150 gallon capacity in operation in Florida.

tive is to clear out the easier-to-kill species and possibly kill to the ground line or at least retard the growth of the others. With the area partially cleared, it is then possible in a follow-up treatment some time later on to give individual attention to the survivors.

The first spray is usually a general overall spray with the chemical applied in water. The spray solution is carried in large tanks mounted on trucks capable of traveling over rough right-of-way. Pumps force the solution through hoses to men on the ground who direct the spray onto the brush by means of nozzles similar to those used in spraying orchards. An effort is made to wet everything having tall growing habits and all lower brush that would impede progress on foot along the route. Low-growing plants that do not form an impassable tangle are spared wherever possible for their value in preventing the re-establishment of unwanted types.

This spray will keep these Pennsylvania osage orange stumps from sprouting anew.

A successful treatment of this sort will remove up to sixty five percent of the unwanted brush from the right-of-way. Since the chemicals seem to persist in the plant for a considerable time, patience must be exercised in assaying the initial results. Scrub oak sprayed in June has been observed to put on leaves the following spring, only to have them turn brown and the plant apparently die later that summer. A second inspection the next spring would be necessary before deciding whether further treatment was required.

With good results on the first time over, the follow-up treatment, designed to get the plants that either were missed or had survived the first spray, can be directed at the individual clumps. For this work the chemical is applied in higher strength at the bases of the plants. It can be done at any time of the year, since in this treatment the chemical enters the plant through the bark and roots, and leaves are not necessary for the purpose. Because of the smaller volume of spray solution required for a given area, this work can be done using knapsack tanks carried by the men, although truck-mounted equipment is also used.

Where the brush growth is beyond reasonable spraying height, or where spraying standing brush would leave an unsightly strip along the roadside, the practice of cutting the brush and spraying the remaining stumps and stubble is followed. This treatment is similar to the basal spray and is effective in preventing the otherwise almost certain sprouting from the portion left in the ground. It is especially suited

for handling spiny growth like the osage orange or mock orange which was commonly planted years ago as fencing in rural areas. If killed while standing, this tree continues to present a thorny problem for years to come.

Some right-of-way is so inaccessible to vehicles or afoot that the chore of moving the chemicals and equipment to the spraying site becomes a task in itself. Costs may double or triple for the usual methods of treatment. In these situations some success has been had by spraying by helicopter. The lifting ability of such craft is limited, so that only comparatively small volumes of high-strength chemical are handled on each flight. This method is useful in keeping down the height of the brush, but a high rate of kill except on the most susceptible species does not appear likely. Because of the danger of drift of a spray stream applied at a height above the line, its use is confined to locations where the spray would not do serious damage if it should happen to be blown by the wind beyond the limits of the right-of-way.

The spraying is being done mostly under contract by line service companies experienced in right-of-way clearance work, and costs have shown a downward trend over the last three or four years. It is likely that this year will be the last year to see cutting done on any telephone right-of-way suitable for spraying. Even this will be done only because it is necessary in preparing the area for chemical treatment.

Considering that the annual bill for right-of-way clearance for the Bell System runs into millions of dollars, even a modest reduction in the total is worth going after. At present, a conservative estimate of future maintenance expense would place the annual saving at about fifty percent. Manufacturers of the chemicals are constantly at work improving their products and developing new ones. Field experience is showing the way to better methods of application. It is not beyond the realm of possibility that within the next few years, brush on our rights-of-way will be reduced to a point where it can be controlled simply as a part of the routine inspection of the lines.

Experimental spraying by helicopter on a mountainous right-of-way in California.

A non-lawyer who became General Patent Attorney and an authority on electricity, electrical patents, and patent law contributed much to early telephone development

THOMAS D. LOCKWOOD: AN EARLY BUILDER

RALPH E. MOONEY

Historical Librarian, A. T. & T. CO.

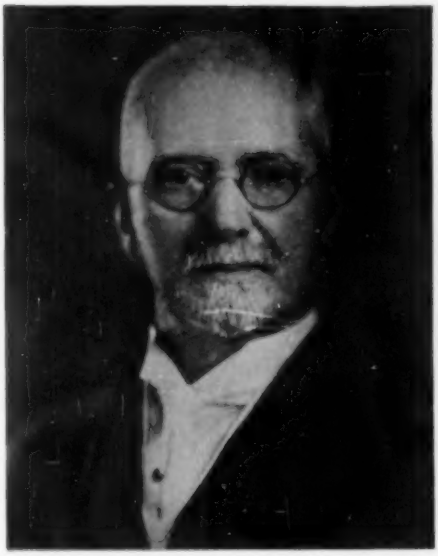
THOMAS DIXON LOCKWOOD is not often talked about today. If he is mentioned, it is usually as the man who once held the position of General Patent Attorney without being a law graduate. That in itself reveals much about him. By sheer application he made himself an authority on electricity, electrical patents, and patent law. He earned his title—and earned it well.

Dickens might have done the beginning of his life story, with Horatio Alger to take care of the American chapters. He was born in Birmingham, England, in December, 1848—less than two years after Alexander Graham Bell was born in Edinburgh. He began work at the age of eleven, washing emery at the Birmingham Plate Glass Works. He moved from this beginner's job to a Boulton and Watt machine shop, where he worked until 1865, when his parents brought him across the Atlantic. Like Bell, he began his American career in Canada.

At Port Hope, Ontario, he learned telegraphy and became an operator. But the company he worked for was consolidated with another, and his job vanished. So he crossed the border and, while working in a paper mill in Massachusetts, took out his first papers for naturalization.

He roamed a little, but was never idle. Four years later, while working in one of William C. Depauw's glass factories, at New Albany, Indiana, he contributed an article on the manufacture of plate glass to the *Scientific American*. This achievement, when he had scarcely turned twenty-one without benefit of formal schooling, is another proof of his passion for and progress in self-education. The British machinist's helper was on his way up.

Back in telegraph work in 1872, he served for a time as chief signal operator at Morristown, N. J., for the Delaware & Lackawanna Railroad; then moved to New York, where he worked for the Gold & Stock and American District telegraph companies.



Thomas D. Lockwood: at about the time of his retirement in 1919, and in the early '70's. The device on the table at the right is a telegraph relay.

His connection with the American District company (about 1876) was a fortunate one. That company operated local telegraph and burglar alarm services out of small district offices that were found to be readily adaptable to telephone service when it came time to introduce Bell's invention—which was patented in 1876, you will remember—for commercial use. In New York and quite a few other cities, a number of early telephone exchanges started out by using the wires and office facilities of A.D.T. companies. Telegraph and telephone lines were then much alike, so that it was easy to connect a telephone in place of the A.D.T. instrument at the subscriber's premises, and not very difficult to complete calls through a primitive switchboard at the A.D.T. office.

In New York City, by the end of 1879, several telephone exchanges were operating separately. They were interconnected later, of course, but at that time one belonged to a Western Union Telegraph subsidiary, one was strictly Bell, and two others were under Bell license. Early that year, when A.D.T. was considering taking out a Bell license, Theodore N. Vail, then general manager of the National Bell Telephone Company in Boston, went on a still hunt for likely telephone talent. He recruited Henry W. Pope, general superintendent of the A.D.T. Company, first of all —and Pope, in the years that followed, had much to do with the development of the metropolitan telephone system. Pope also recommended Lockwood to Vail.

Lockwood knew nothing about this. While he was on duty in the A.D.T. office at 699 Broadway near one midnight of July, 1879, he saw a man stroll into the public space outside the office railing. No, said this stranger, he did not want to hire a messenger or send a telegram. He seated

himself as if waiting for someone. Lockwood's assignment that night was to transfer all the burglar alarm equipment from one side of the office to another. Possibly this was to make room for telephone apparatus—although Lockwood does not say so in his account of the occurrence. Lockwood worked on, taking note from time to time that the stranger still was sitting in the outer office. In the small hours, Lockwood concluded the man probably was a visitor to New York who had been unable to find a hotel room and so had decided to pass the night in the A.D.T. office because it was one of the few places open.

When morning came and the transferred alarms, one after another, recorded a signal which indicated that the property they protected had been opened for business and that all was well, Vail spoke for the first time. He asked Lockwood if the lines were working satisfactorily and, when told they were, departed without identifying himself. But within a few days, Lockwood received a letter from Vail offering him a job with the National Bell Telephone Company, in Boston. He did not identify Vail with his all-night visitor until he called at the Boston office in answer to the letter.

VAIL TOLD HIM, with a chuckle, that he had felt that he had to stay to see if the lines worked after they were moved, and that when they did, he knew all he needed to know about Lockwood. The incident reveals something about both men and much about the Bell System in its second year of operation. That the general manager of the National Bell could and did give a whole night to selection of one new employee says a great deal about the size of the business and the attitude of its chief executive.

In Boston, Lockwood was made an inspector to begin with. Inspectors were needed in those days to visit subscribers' premises once or twice a month to put solution in the wet batteries that went with each telephone, and otherwise to keep the equipment in working order. And, although the National Bell was the headquarters of whatever Bell System existed in 1879, it also was operating some telephones in Boston which Lockwood helped take care of.

Before long, he moved from the street into the shop that was the fore-runner of the Mechanical Department which in turn was the ancestor of present-day Bell Telephone Laboratories, Inc. And in 1881, a year after American Bell had succeeded the National Bell as headquarters company, he was put in charge of the Patent and Technical Information Department.

JUST HERE, it might be well to understand how a man who was not a lawyer could become a "patent attorney"—which title Lockwood achieved in 1908—and serve as such with one of the largest corporations in the country. This could not happen today to anyone not a law graduate, although anyone who meets the requirements of the Patent Office may still practice as a patent *agent*. Under the old rules, however, anyone who met such requirements could call himself a patent attorney. He could not represent clients in court, but was authorized to prepare patent applications and act as an agent of inventors in getting patents for them. So Lockwood earned this position while on the job, just as many a contemporary passed bar examinations by "reading" while working as a clerk in a law office.

THE Patent and Technical Information Department was established under a mem-

The Lockwood siblings long ago. The older and taller boy is Tom. His younger brother, Frank, also worked for the American Bell Telephone Company for many years.

orandum from Theodore N. Vail, General Manager, which directed that it was to "collect data respecting electrical patents, and make digests of same." It was also to "draw the attention" of the management to any special points noted about each patent, and was to call attention to the relationship between new patents and older ones, and cite references to confirm the point. The Department was also to draw specifications for patents on inventions of Bell men, and it had the further duty of examining trade journals and textbooks and collating them for convenient reference, especially as they bore upon the art of telephony.

In his work, Lockwood was directed to consult freely with Thomas A. Watson, William W. Jacques, and Emile Berliner, who then constituted practically the entire technical staff of the company. Watson was the young electrician who happened to be assigned to assist Bell in making experimental telephone models, and whose ingenuity was largely responsible for the development of early commercial apparatus. Jacques was a former Johns Hopkins professor who at this time was in charge of testing of equipment as it came from the several factories then making our apparatus. Later, he worked for many years making special apparatus for the use of Bell System lawyers in the prolonged litigation over Bell's original patents. Emile Berliner was inventor of the "loose contact" transmitter, and did important work in the development of other transmitters.

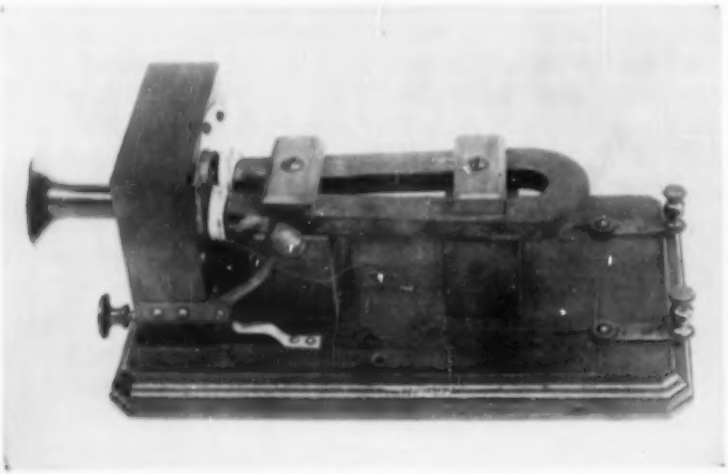
Lockwood amplified and expanded the scope of that widely inclusive memorandum as time went on, producing memoranda of his own which added to his duties the establishment of a technical periodical library, and the more or less

continuous production of a history of telephony, with a few other less imposing projects.

By steady work, aided only by a very small staff—usually two or three people—Lockwood did monumental work. Within a year or so he made himself a truly great authority in his chosen field of patents, patent law, and electricity, and was of immense assistance as an advisor to J. J. Storrow, Charles H. Swan, and other attorneys who represented the American Bell in the six hundred and more suits that were necessary during the '80's and '90's to protect the telephone patents. Indeed, his exhaustive memoranda upon telephone patents and his painstakingly accurate notes on phases of telephone history are often referred to by our lawyers today. One history of the growth of our business which he started, with several telephone engineers and executives as collaborators, was used even in its incomplete state (it never was finished) for the historical orientation of public relations people when such work was undertaken on a departmental basis. It is reflected in some important policy statements in our Annual Reports from 1908 to 1915.

Angus Hibbard, who designed the Blue Bell trademark while a superintendent for A. T. & T. Co., says this of Lockwood in his autobiography: "Thomas D. Lockwood . . . had become the custodian of patents and expert advisor in matters relating to them. He was invaluable in this capacity."

Lockwood often appeared as a witness for the Bell companies before courts and commissions. Incidentally, whether from this experience or otherwise, he developed himself into a public speaker of marked ability. He was in demand for lectures at churches and clubs, and so may be considered a fore-runner of today's telephone lecture-demonstrators.



Interior of a box telephone of 1877—the first commercial telephone instrument. The little hammer at the left front is a "Watson's thumper," which served as a signal by striking on the diaphragm and sending a sharp knock through the diaphragm of the distant telephone.

Lockwood's prodigious memory and capacity for detail would have lifted him to even a higher place than he ultimately achieved in the Bell System had it not been for a curious blind spot in his personal outlook. This is most evident in a memorandum which he wrote in 1885, when Theodore N. Vail and E. T. Gilliland, head of the Mechanical Department, resigned from the American Bell Telephone Company (successor to the National Bell, in case you don't remember). He addressed it to John E. Hudson, who succeeded Vail as general manager of American Bell and who later became president of that company.

In this memorandum, Lockwood suggested himself to replace Gilliland in the Mechanical Department; and, in his proposals as to the future conduct of the department, he took a position that certainly was odd in a student of patents and inventions in a business that owed and was certain to owe so much to research and invention. He advocated that the Mechanical Department restrict itself to perfecting apparatus already at hand and to testing equipment delivered from the factories, leaving anything like pure research and new fields of invention to people outside the business.

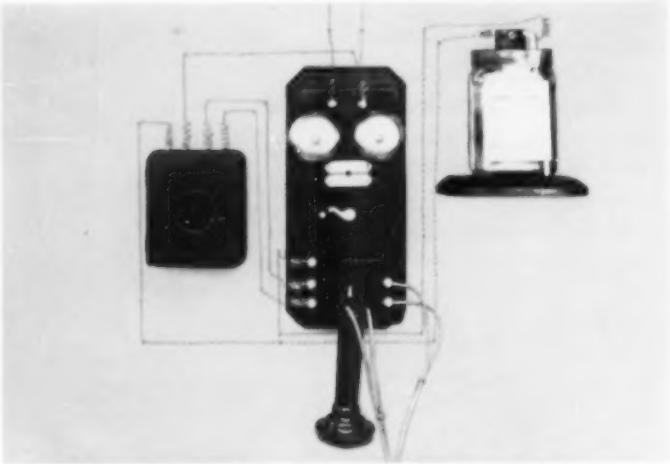
He was not put in charge of the Mechanical Department, but his constant opposition to research and invention made him something of a storm center for many years. For an instance, in the late '90's a Bell System engineer-scientist named John Stone Stone followed Hutin, LeBlanc, Pupin and others in important work on what were then called "resonating circuits." Stone's researches were useful years later when carrier telephony was developed, but instrumentalities to carry out his findings were lacking when he reported

The first type of telephone bell, successor to the thumper. Thomas A. Watson's arrangement for ringing the called telephone continues in use today—in theory, at least.

them. Lockwood thought this sheer waste, and said so.

Thus in mid-career he nominated himself a Conservative in a business that had to be Progressive—putting himself in a position where he simply could not win. His attitude probably was a result of the lean years of his boyhood. He was careful of the company's money, careful of his own, suspicious of luxuries. Although well paid for his day, and a shrewd trader on the stock market, he never kept a horse or, what is less understandable, an automobile, although he lived until 1927 and was easily able to afford one.

In another of his lengthy memorandums, also written in 1885, he doubts that the experiment of using girls as operators will ever be considered an unqualified success. In a later one, he was convinced that some day it would be necessary to bring the manufacture of telephones back to Boston from Chicago. These ideas, long proved



This is the type of telephone that Lockwood tended on his first Bell job as inspector. The wet battery appears on a shelf; but not long afterward the first wall telephones were designed, with a cabinet for batteries under a sloping lid which came to be called a desk.

wrong, reflect his personality again. They both were intended to cut expenses, to cling to the known and not to accept anything new until its value was proved.

One day, Lockwood happened to be waiting to see John E. Hudson, by then president of American Bell Telephone Company. The anteroom at 95 Milk Street, Boston, was in charge of an office boy, Joseph A. Gately, who was reading. Lockwood asked what book it was, and, when he found it was *Paradise Lost*, quoted many passages to illustrate the modern marvels Milton had foreseen. Gately, writing of the incident later, could not recall why he happened to have that work in hand that day, and was certain he had never seen it thereafter. Nevertheless, because of it, Lockwood took an interest in him, and soon afterward insisted that Hudson—who could be formidable about such matters—release Gately to the patent department, where Gately made quite a career in his own right.

The reason Lockwood gave for the move was also characteristic. How could a boy get anywhere in life if he sat through most of the business day reading instead of working?

Lockwood's own reading was done in his spare time, which he put to use in other ways. He made himself an authority on the Bible. He acted for years as treasurer of his church and superintendent of the Sunday School. He was one of the originators of the American Institute of Electrical Engineers, of which he was a charter member and an officer. He took up astronomy, which led to his acquiring a telescope for use at home.

At one time, he decided to read the Encyclopedia Britannica in its entirety and devoted half an hour a day for many years to this project.

During his early days with National Bell, he contributed a "Notes & Queries" column to the publication called *The Operator*. This work he later had published in book form as *Electricity, Magnetism and the Electric Telegraph*. Another series of articles became *Practical Information for Telephonists*. Still later he produced a *Textbook of Electrical Measurements*.

Incidentally, Lockwood sent his book for telephonists to Mark Twain, with whom he had become acquainted. It elicited a reply in the humorist's customary style:

"I have read your book with great interest, particularly the first part, which details the history of electricity. I read the rest of the book just as I read a German book—for the sake of the solid enjoyment one gets out of almost understanding what he is reading, but falls just enough short of it to leave his mind in a state of enthusiastic confusion. You are so familiar with the technicalities that they seem simple and easy, but to an outsider they convey a darkness as impenetrable as our easy alphabet conveys to a Comanche. I read the whole book with pleasure, as I have already intimated, but I could not set up a telephone circuit now, nevertheless, which would pass inspection. I know I should get some of the ohms in the wrong place."

Old-timers who remember Lockwood are scarce now, but there was a time when nearly everyone had a favorite anecdote about him. For he certainly was a "character," as today's slang puts it. For years he budgeted his salary, carrying a sheaf of envelopes in his pocket, each to receive its allotment toward some purchase or project. After he died, a considerable sum in currency was found tucked away in books in his library. In training his only son to face the world, he did not advance the money for his education, but loaned it to him at interest. And so on.

Angus Hibbard, mentioned earlier, tells a yarn that is more unusual. The other man in it is Frank A. Pickernell, then chief engineer of A. T. & T. Co. Hibbard writes:

"Lockwood was very fond of Pickernell and once when I called on him in Boston, he asked, 'How is Pick?' I said, 'Pickernell was all right yesterday. Let's call him up and talk with him.' To which Lockwood replied, 'No, I suggest that we have him call us up.' I asked what he meant and he said, 'You sit down and wait a minute and we will hear from him. He will call us from New York.'

"Less than two minutes later the telephone bell rang. Lockwood responded and said, 'Hello, Pick, here is Hibbard. I told him you would call us up. You talk to him.' I took the telephone and asked Pickernell why he had made the call and he said, 'I don't know. I just happened to think about Lockwood and called him.' Lockwood laughed and said, 'I would almost do that on a bet.' I can only say with Pickernell, 'I don't know,' but that is just what happened that day in Lockwood's office."

When Tom Lockwood retired, he had spent the better part of half a century helping to make the telephone an instrument of national service. His work was never spectacular, but is firmly a part of the foundation on which our business rests. He retired in 1919, and died eight years later.

HEADQUARTERS SUMMARY

Sept. 15 to
Dec. 15, 1954

AGREEMENTS recently executed by the National Park Service with two of the Bell companies provide for the furnishing of telephone company services in Glacier National Park, Montana (Mountain States Company), and Big Bend National Park, Texas (Southwestern Company). The Government itself has heretofore provided the telephone service in these parks. Arrangements were made by the two companies to purchase those existing Government-owned communication facilities in the parks which would be useful in the furnishing of telephone company services. Plans are now under way for extensive additions and replacements, assuring high quality telephone service for the national park authorities, the concessionaires, and the visiting public in the coming seasons. A number of the other companies have studies under way looking towards the furnishing of telephone company services in other national parks.

A NUMBER of intercity communications facilities owned by electric power companies and railroads and used by them in their operations were knocked out by the recent hurricanes. In many of these cases the Bell telephone companies were called upon to provide substitute facilities and did so—providing a total of some 60 intercity circuits, ranging up to hundreds of miles in length, to replace the damaged privately owned links.

BELL SYSTEM EMPLOYEES elected to purchase about 50% more shares of A. T. & T. stock than were available under the Employees' Stock Plan offer which terminated last December 15. This constitutes the fifth stock offer to employees in the last seven years. Out of the 3,000,000 shares authorized by share owners in 1950 for issue under this Plan, about 1,550,000 were taken by employees in the first offer, on which installment payments are now being completed, leaving some 1,450,000 unsubscribed shares available for the recent second offer. However, the 657,650 Bell System employees eligible to purchase stock on the installment plan at $20 below market price (at a maximum price to employees of $150 and a minimum of $100) applied for 2,208,000 shares. Obviously, this made it necessary somehow to cut total elections back to 1,450,000 shares; so, as provided for in the terms of offering, the available shares were allocated to employees who had elected to purchase by changing the allowance of one share for each $500 of annual base pay to one share for each $810. Of course, as the terms of offering also stipulated, shares becoming available through cancellations may from time to time be allocated to employees whose elections to purchase had been cut back in the original allocation and who have not canceled any part of their election to purchase.

WHEN THE CALL of A. T. & T. Convertibles of 1963 and 1964 for redemption on December 15, 1954, was announced on September 15, about $45 million par value of these bonds were outstanding in the hands of perhaps 40,000 owners. Since the bonds were issued in unregistered bearer form, the company had no real record of who these holders were. However, a number of special steps were taken to alert bondholders to the call, including the mailing of letters to the people to whom the bonds which were still outstanding had originally been delivered. As a result of these measures, all but $3.1 million of the bonds were converted by the redemption date. This meant that most of the holders gained advantage of the conversion privilege attached to the bonds, which was worth about $30 per $100 bond when it terminated on the redemption date.

On December 15 the Company announced the further call of its Convertibles of 1961, of which about $44,000,000 were then outstanding, for redemption at $103 on March 1, 1955. Completion of this call will leave but one A. T. & T. Convertible issue outstanding, namely, the 3¾s of 1965, of which about $125,000,000 were left unconverted at the end of 1954.

During the year the Company established a new record for the amount of equity capital added in any one year, with nearly $800 million derived through the conversions of bonds into stock. About $213 million of this amount represented actual new capital. The result was a reduction in the debt ratio of the Bell System from 41.25% at the end of 1953 to approximately 37% at the end of 1954, representing the lowest year-end figure since 1945.

MORE THAN a hundred Independent telephone companies were asked last November by the United States Independent Telephone Association to study, jointly with the Bell companies, certain of their toll line operations involving some 650 circuit groups. The objec-

tive of this study is to determine the appropriateness of present toll line settlements with the Bell companies for handling interchanged business. Study procedures were worked out jointly by Bell and Independent representatives, and the Bell companies are actively assisting the Independents in completing these studies. Completion is expected by some time in the Spring of 1955. Completed records will provide a valuable basis of facts for appraisal of present toll line settlements—a matter of equal importance to both Bell and Independent companies.

BY THE END of 1954 the Bell System television network had reached a total of 68,500 channel miles, 20,000 channel miles of radio relay and coaxial cable facilities having been added during the year. At that time more than 355 television broadcasting stations in more than 230 cities were linked by this intercity network, a gain of about 100 stations and 75 cities. A number of newly constructed branch lines extending from the major routes made possible much of this growth.

ON NOVEMBER 1, the latest type of coaxial, called L–3, was placed in service between Miami and West Palm Beach, Florida, to provide television network service. Because of its greater band-width, the system makes it possible for a pair of tubes to carry two television programs and 600 telephone conversations simultaneously. During 1954, the major television network routes were also equipped to handle the transmission of programs in color—in all, some 47,000 channel miles. At the close of the year, nearly 140 stations in about 100 cities could receive the latest type of television picture.

PLANS ARE BEING MADE by Long Lines for the construction of an over-the-horizon radio transmission system between Florida and Cuba. This will be the first use of over-the-horizon radio transmission in the broad band widths required for multi-telephone circuits and television, Research by Bell Laboratories indicates that transmission for distances up to 150 miles without intermediate amplification is feasible in the frequency range of about 500 to 1,000 megacycles and for band widths required for broad band telephone and TV transmission. The proposed system would make use of high-power transmitters and large antennas to force signals between Southern Florida and the northern coast of Cuba. All facilities in the submarine cables which provide service with Cuba are now in use. The proposed radio system would furnish many additional telephone circuits and provide diversification of facilities. It would have the further advantage of permitting experimentation with television transmission, looking toward the establishment of international TV broadcast service over this route.

SWITCHING SYSTEMS which will permit automatic alternative routing of long distance calls and enable them to be dialed to their destination were installed by the Long Lines Department at Charlotte, N. C., Denver, and White Plains, N. Y., on November 21. An unusually extensive program of open houses was held in connection with the opening of the switching center in the new building at White Plains, which serves as the headquarters of the Long Lines Eastern Area. Three "family nights," two occasions to welcome regional civic leaders, an open house for Associated Company employees, and two for shareowners of A. T. & T. Co. common stock who reside in the vicinity, were held.

A NEW transistor triode that, even in experimental form, has operated at higher frequencies than any previous design—well into the range used by FM radios and television—has recently been developed at Bell Laboratories. The new device, called an "intrinsic barrier" transistor, has already operated at 440 million cycles, and frequencies as high as 3,000 million cycles are theoretically possible.

MUCH OF Bell System and military equipment must operate efficiently under extreme conditions of temperature, moisture, and physical shock. Bell Laboratories' chemists and engineers have found the new liquid thermosetting plastic resins to be the answer to many difficult casting and potting problems, where complex electronic equipment must be encased to withstand rugged usage.

IN both sales of stock items and repair of telephone equipment, 1954 was a record year for the Western Electric Company's distributing houses. Stock volume—or sales from stock of both new and reconditioned items—was 12% greater than in 1953, and the value of material repaired was up 15% over the previous year. In all, Western's Houses delivered 19,700,000 stock items to Bell System customers during the year.

Who's Who & What's What

(Continued from page 207)

AUTHOR IN 1951 of a series of Bell System Practices describing the methods of application of various chemicals for brush control in right-of-way maintenance, STANLEY A. HAVILAND had spent the years since 1947 in investigating the possibilities of adapting those procedures for telephone company use. Starting with the New York Telephone Co. in 1924, he had gained experience in the plant and engineering departments by the time he transferred to the O. and E. Department in 1929. His assignments in outside plant construction and maintenance led naturally to his present interests.

Stanley A. Haviland in his garden, practicing what he preaches

LESSER KNOWN INDIVIDUALS among the "founding fathers" of this business are one of the particular interests of RALPH E. MOONEY, who since 1945 has been historical librarian of the A. T. & T. Company. His telephone career began in 1924, after some years of newspaper and trade journal experience, when he joined the Public Relations Department of the Southwestern Bell Telephone Company in St. Louis. Before transferring to New York in 1944 he had been editor of the *Southwestern Telephone News*, and in recent years he has been a frequent contributor to this MAGAZINE. His most recently published article was "The First Seventy-Five Years," in the issue for Spring 1951, and he contributed a book review, "Forbes: Telephone Pioneer," to the issue for Autumn 1953.

Historical Librarian Ralph E. Mooney reaching for the facts

DR. GEORGE ASHLEY CAMPBELL

NOT LONG AFTER Dr. George Ashley Campbell retired from the Bell Telephone Laboratories in 1936, the A. T. & T. Co. issued a volume containing his technical papers, in commemoration of his long and distinguished services as research engineer of the company and of his fundamental contributions to the development of telephone transmission. Just 17 years ago the BELL TELEPHONE QUARTERLY, in its issue for January 1938, was able to publish the first two chapters of that book. These were a *Foreword*, by Dr. Vannevar Bush, then Dean of Engineering of Massachusetts Institute of Technology, later President of the Carnegie Institution, and an A. T. & T. Director; and an *Introduction* by the late Dr. Edwin H. Colpitts, a former executive vice president of the Laboratories. These chapters were somewhat less technical than Campbell's own writings, and were published here as in the nature of an "appreciation."

Dr. Campbell died on November 10, 1954, and the Laboratories has put forth a memorial statement, from which we are able to quote only briefly:

"The passing of Dr. George Ashley Campbell . . . marks the close of an era that has seen the communication art grow from infancy to robust manhood. . . .

"Though Campbell's achievements are now best known by his personal mathematical contributions, he contributed to the advance of telephony in another way that should not be forgetten. He it was who hired Frank B. Jewett and Edwin Colpitts, and others, whose ability and training fitted them for leadership in the application of scientific knowledge and methods to the practical problems of telephony.

"He was a gentle and retiring man, but to those who knew him best he was a lovable companion who sought not fame or high position, but understanding. His interest in the technical problems of telephony continued to the end of a long and active life. Out of his work came useful and readily available mathematical tools for those who followed him, but more importantly a spirit of inquiry that left its enduring imprint on the character of the Bell Telephone System as we know it today."

Of particular interest to telephone people will be a paragraph from a letter written after his father's death by Dr. Ashley S. Campbell, Dean of the College of Technology at the University of Maine:

"He was certainly a fortunate individual to associate with a company which had such an enlightened point of view towards pure research. He could have easily become frustrated had he joined some other organization. I think it is very much to the credit of the Telephone Company that they recognized his ability and allowed him the freedom of thought and action which they did."

PROMPT MAILING of quarterly dividend checks to 1,305,000 share owners is a "must" for A. T. & T. Treasury people. To expedite delivery, an extra step was added more than a year ago to the dividend preparation job, which involves sorting the checks into geographical zones for earlier mailing to distant points. But one difficulty is always present: Nearly 40,000 share owners change their addresses between quarterly payments and some fail to give notice of their new address. For last October's dividend, this resulted in over 1,300 checks being returned by the post office as undeliverable because the owners had left no forwarding addresses. About 1,000 checks were remailed to new addresses as a result of inquiries from owners, and tracers were then started on the remainder. In this work, Associated Companies always render most helpful service through their records and local contacts. Sometimes owners are traced through banks or brokers they have used, sometimes through friends or relatives. By dint of such detective work, Treasury people are usually able to locate most of the remaining missing owners each quarter. When a check is undelivered in the previous quarter, of course the current dividend check is not mailed. It cannot be said how many owners are permanently missing, as some of the most stubborn cases are cleared up from time to time, but there are at present fewer than 180 domestic cases over two years old, representing ownership of under 650 shares, and about 80 foreign cases with some 475 shares.

The Blue Pencil

Lines To A Lineman

No word of pen or stroke of artist's hand,
No flowered phrase or oratory's boast,
Need tell the story of the world you've made.
'Tis writ upon the pages of the land
From north to south—from coast to coast.

Those poles you mount,
Those lengthened strands you string,
Are not just sturdy uprights in the sky
That march across the miles in proud parade.
You've made them into words that help and sing—
A doctor's call, good news, a lover's sigh.

Deep etched in time the record of your skill,
The work you've done, your willingness to do,
The fires and storms you've tackled unafraid.
Your signature is carved on every hill.
Yours, too, the creed—"The message must go through."

These words are brought to mind by the competent figure on our cover—although they were written for another occasion. From the pen of George Cecil, an officer of one of the agencies which handles A. T. & T. Co. advertising in national publications, this verse appeared in such an advertisement in the Autumn of 1953. So exactly does it express the feeling of Harry Sternberg's etching that we are happy to borrow it for our own purposes.

Several of the major components of this issue have overtones, or coincidental values—or whatever you choose to call items which catch the eye in relation to other items.

Last Autumn's hurricanes were bad news on a vast scale, as John Mitchell's article makes clear, and it is quite natural that there should be a good many references to the events in the press. One such, in the Newburyport, Mass., *Daily News*, had to do with some of the out-of-state telephone crews which came to the aid of their New England colleagues, and said, among other things, "Residents of Parsons Street say they want to re-name the street Virginia Avenue in honor of the telephone boys from Virginia who are working so hard to restore phone service in that area. The crew of five men from The Chesapeake and Potomac Telephone Co. has been working there since last Friday night and their cheerful 'you all' greetings each day have made them great favorites in the neighborhood. Incidentally, two of them had lobster for the first time the other night, and thoroughly enjoyed the famous New England specialty."

Another, appearing in the Wilmington, Del., *News* after the third blow, had a word to say about outdoor public telephone booths, and then continued: "The other night, after the hurricane, motorists on a road in nearby Pennsylvania were passing through an area where the electric blackout was complete. Complete, that is, except for the portable lights of the linemen of the power and telephone companies. From place to place they were hard at work up their respective poles splicing their respective wires. Maybe there was a bit of good-natured rivalry between the men of the two outfits. What tickled the motorists was a particularly lonely little booth standing there in the darkness. But it wasn't dark inside. A single flickering candle within left no doubt—temporarily at least—as to which outfit was one up on the other."

And do you remember that in this place last Autumn we questioned the appropriateness of feminine names for such brutal things as hurricanes, and suggested, in place of "Carol" and "Edna," such terms as "Caesar" and "Eagle"? Well, out of Washington via the United Press came, last December, a dispatch which said in part: "The Weather Bureau will decide next month whether to stop using girls' names for hurricanes and start calling them something else—maybe Antelope, Bear and Coyote, or Attila, Bluebeard and Cain."

Still, we were speaking of coincidences.

Stanley Ericson's contribution on telephone numbers rings a bell too. For in Chicago a seeing-eye dog was found whose only identification was a tag reading "E. Williams, 400 S. Cherry St., FA 8418," but no city name. Chicago has no South Cherry Street, so the Illinois Bell Telephone Company was asked to identify the telephone number. A quick search showed it was the Falls Church, Va., number of Miss Esther Williams, who had recently moved to Chicago. She was located at the Veterans' Administration Research Hospital,

where she is employed. After Tessa was returned to her, Miss Williams hurried to obtain a teletag listing her Chicago number.

WHICH LEADS—down grade, perhaps—to the yarn, allegedly factual, about the dog which growled, snarled, and generally went into a tailspin whenever the telephone rang in the residence where he lived. A veterinarian was called in who was somewhat of a canine psychiatrist. He found that this particular animal had had a broken leg, and while recuperating his bed was near the telephone. Even though the dog was not allowed up on the couch (and a psychiatrist without a couch is certainly at a disadvantage) he was able to diagnose the case perfectly. The dog associated the pain he had undergone with the ringing of the bell. Accordingly, a set of chimes (now standard telephone equipment) was substituted. The dog is now perfectly normal and well-adjusted.

WHILE CHRISTMAS is still fresh in the minds of us all, perhaps you would like to hear about the telephone man who made this happy holiday safe as well. For it was a telephone man who first put electric lights on a Christmas tree. Until he did so, wax candles glowed softly—and dangerously—among the dry, explosive needles.

Leavitt F. Morris, travel editor for *The Christian Science Monitor,* reports that as a small boy he crawled under his Christmas tree and upset a candle. It only singed his hair, but his father, Ralph E. Morris, who worked in the telephone office at Cambridge, Mass., promptly announced there would be no more such dangerous flame near a Christmas tree in his home. During the year that followed, Mr. Morris bought several dozen telephone switchboard lamps, and put in many evenings soldering the tiny bulbs to a pair of wires and covering them with colored paper. His tree, at Christmas, brought gasps of admiration from those who saw it.

"Of course," Leavitt Morris writes of his father, who now lives in Laconia, N. H., "my Dad never realized then—and I'm not certain he has given it much thought since—that that lone tree with its improvised lamps has really never stopped glowing. Its tiny lamps shine on millions of trees each Christmas."

SO WE ARRIVE, by a circuitous route, at the matter of our cover etching and its creator, Harry Sternberg. A native New Yorker, he numbers among his accomplishments those of painter, graphic artist, muralist, industrial designer, lecturer, author—and, of course, etcher. He was a Guggenheim Fellow in 1936, and is represented in museums, galleries, and private collections from coast to coast. His is the fourth—and last—of the series of original etchings which have graced the covers of Volume XXXIII of this MAGAZINE; and, like those which have preceded it, a reproduction without printing is available to any telephone employee who will ask the editor for it. Actually, a *few* reproductions of the other three still remain, and, since they do nobody any good in storage, will be sent while they last to those who wish to round out a collection. Please specify the ones desired.

THERE IS one collection of the covers which is unique. For it consists not only of four original etchings but of the copper plates from which they were pulled—and the latter are, of course, the only ones in existence. They hang, framed, in an A. T. & T. office in New York. Guess whose?

They hang . . . in an office in New York

The Vision of a Man Named Bell

At the conclusion of the ceremonies in connection with the unveiling of the Alexander Graham Bell plaque in the lobby of the A.T.&T. building in New York last November (as recounted on an inside page), the distinguished actor Walter Hampden read to the gathering "The Vision of a Man Named Bell." This tribute was written by John Milton Caldwell in commemoration of the Seventy-Fifth Anniversary of the telephone, was first read by Mr. Hampden on the Telephone Hour of March 5, 1951, and was carried in full in this MAGAZINE for Spring 1951. The last stanza is given below.

How does a man's dream grow?
It grows as a nation grows,
Eternally leaping the horizons,
calling others to follow –
And the others caught up in his vision –
the builders, the planners,
The lineman against the sky –
the girl at her switchboard –
The scientist charting the tides
of invisible sound –
The splicer sealing the joints of the cable –
All are the weavers of speech serving
the nation in peace and in war
Carrying the word – across the
silence of time and of space –
Along the gleaming wires –
all the words of love and birth and life –
Throughout all the land – to the
farthest village and town –
And beyond the dark seas – and the endless
horizons beyond the earth's curve –
This was the vision of a man
named Bell –
And we are the inheritors
of his dream!

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